FINAL

ENVIRONMENTAL IMPACT STATEMENT

for

Newfield Exploration Corporation
Monument Butte Oil and Gas Development Project
in Uintah and Duchesne Counties, Utah

UT-G010-2009-0217

Volume 1: Preliminary Pages – Chapter 3

BLM

Green River District – Vernal Field Office

U.S. Department of Interior
Bureau of Land Management
Vernal Field Office
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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Green River District Office
170 South 500 East
Vernal, UT 84078
http://www.blm.gov/ut/st/en/fo/vernal.html

IN REPLY REFER TO:
1311 (UTG01000)
DOI-BLM-UT-G010-2009-0217-EIS

Dear Public Land User:

Enclosed is the Final Environmental Impact Statement (FEIS) for the Monument Butte Area Oil and Gas Development Project. It can also be found online at http://www.blm.gov/ut/st/en/fo/vernal/planning/nepa_.html. This FEIS analyzes Newfield Exploration Company's proposed oil and gas infill development scenario for BLM land south of Myton in Duchesne and Uintah Counties, Utah. The Monument Butte Project Area (MBPA) encompasses approximately 119,743 acres in an area that already contains 3,209 oil and gas wells.

This FEIS has been developed in accordance with the National Environmental Policy Act of 1969 and Federal Land Policy and Management Act of 1976. The Bureau of Land Management (BLM) prepared the FEIS in coordination with numerous Cooperating and Consulting Agencies including the United States Fish and Wildlife Service, United States Environmental Protection Agency, Utah Public Lands Policy and Coordination Office, and Uintah and Duchesne Counties. The BLM revised the FEIS based on comments received during the public comment period on the DEIS. The FEIS includes responses to comments received during the public comment period (Attachment 2 of the FEIS).

The BLM revised the Agency Preferred Alternative between draft and final. BLM made the change based on public comment which pointed out the technical infeasibility of the alternative as relates to production facility and water-flood operation limitations on direction drilling reach. BLM engineers reviewed the comment and determined the technical points of the comment were correct. These technical issues affected the proponent's ability to diligently and efficiently develop oil and gas resources as required by regulation and the terms of their leases. Therefore the BLM determined adjustments to the agency preferred alternative were necessary in conformance with the purpose and need of this EIS. The Agency Preferred Alternative revisions are wholly within the range of alternatives considered in the DEIS, therefore the BLM determined that a Supplement to the draft was not warranted. However, the final wait period is being extended to 45 days to allow agencies and the public sufficient time to review the changes.

The revised Agency Preferred Alternative is designed to protect the relevent and important values of the Pariette Wetlands Area of Critical Environmental Concern, avoid or minimize impacts to riparian areas and floodplains, avoid or minimize and mitigate impacts to two threatened Sclerocactus species and their core conservation areas, and to utilize directional drilling to minimize new surface disturbance and habitat fragmentation throughout the project area. Up to 5,750 new oil and gas wells would be drilled. Additionally, approximately 226 miles of new

roads and pipelines would be constructed, 21 new compressor stations would be constructed, three existing compressors would be expanded, one gas processing plant would be constructed, 13 new water treatment and injection facilities would be built or expanded, 12 gas and oil separation plants would be constructed, one fresh water collector well would be drilled, and six water pump stations would be built. Total new surface disturbance under the Agency Preferred Alternative would be approximately 10,122 acres, which would be reduced to 4,978 acres after successful application of interim reclamation.

Since the finalization of the Monument Butte FEIS, the Utah Greater Sage-Grouse Land Use Plan Amendment Record of Decision has been published. No Sagebrush Focal Areas, General Habitat Management Areas, or Priority Habitat Management Areas occur in the Monument Butte project boundary. Therefore the Utah Greater Sage-Grouse Land Use Plan Amendment does not apply to this project, and does not affect any analysis in the FEIS.

During the Endangered Species Act Section 7 Consultation process for the FEIS, the determination of impacts to Colorado River fish Critical Habitat was changed from that reflected in the DEIS to "not likely to adversely affect" due to the inclusion of many additional applicant- and agency-committed mitigation measures. This is explained in greater detail in the Biological Opinion. In addition, a detailed Conservation, Restoration and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus has been developed for the Monument Butte Project and was included as Attachment F of the Biological Assessment. The Biological Assessment, Biological Opinion, and additional mitigation measures are attached to the FEIS as Appendix J.

There have also been changes to the FEIS air quality section. The DEIS committed to conduct photochemical modeling through the Air Resource Management Strategy post ROD. That modeling platform became available shortly after the comment period on the DEIS, so that modeling was conducted and the results are included in this FEIS. Upon review of those modeling results, the DEIS applicant committed air quality mitigation measures were refined, and additional applicant- and BLM-committed measures to reduce emissions were included in the FEIS. The benefit anticipated from these additional measures has also been included in the FEIS impact analysis. In addition, an enhanced mitigation and monitoring strategy has been adopted by the applicant and included in the applicant committed measures.

This FEIS is not a decision document. The publication of the Notice of Availability in the Federal Register for this Final EIS initiates a 45-day waiting period. Following conclusion of that period, a Record of Decision (ROD) will be prepared and signed to disclose the BLM's final decision and any project Conditions of Approval. Availability of the ROD will be announced through local media, the Vernal BLM website, and Utah BLM's Environmental Notification Bulletin Board.

For further information, please contact Stephanie Howard at (435) 781-4469. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1-800-877-8339 to contact the above individual during normal business hours. The FIRS is available 24 hours a day, seven days a week, to leave a message or question with the above individual. You will receive a reply during normal business hours.

Sincerely,

for Scott Haight
Acting District Manager

FINAL
ENVIRONMENTAL IMPACT STATEMENT
for
Newfield Exploration Corporation
Monument Butte Oil and Gas Development Project
in Uintah and Duchesne Counties, Utah
UT-G010-2009-0217

Lead Agency:

Bureau of Land Management
Vernal Field Office
Vernal, Utah

Cooperating Agencies:

U.S. Environmental Protection Agency (EPA)
State of Utah, (via the Governor's PLPCO)
Duchesne County
Uintah County
Bureau of Indian Affairs (BIA)-Uintah and Ouray Agency
The Ute Indian Tribe

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Abstract:

Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969, the United States (U.S.) Bureau of Land Management (BLM) Vernal Field Office has prepared a Final Environmental Impact Statement on the impacts of proposed oil and natural gas development within the Greater Monument Butte Project Area (MBPA). The MBPA is located in southeastern Duchesne County and southwestern Uintah County. The MBPA consists of approximately 119,743 acres of Federal, State, and private lands. The Bureau of Land Management Utah State Director is the Authorized Officer for this project.

Newfield Exploration Company (Newfield) has notified the BLM Vernal Field Office of its need to expand their ongoing oil and natural gas development within the MBPA. This Final Environmental Impact Statement considers and analyzes potential impacts of proposed oil and natural gas development under four alternatives: the Proposed Action (Alternative A), No Action Alternative (Alternative B), Field-wide Electrification Alternative (Alternative C), and the Agency Preferred Alternative (Alternative D). The Final Environmental Impact Statement incorporates substantive comments received during the public comment period.

EXECUTIVE SUMMARY

INTRODUCTION

Newfield Exploration Company (Newfield) has notified the United States (U.S.) Bureau of Land Management's (BLM) Vernal Field Office (VFO) of its need to expand their ongoing oil and natural gas development within and in the vicinity of the Greater Monument Butte Unit (GMBU). Newfield has derived a plan that it proposes to implement in order to fulfill its obligations and responsibilities under federal leases to explore, develop, and produce commercial quantities of oil and natural gas. The Monument Butte Project Area (MBPA) is located in southeastern Duchesne County and southwestern Uintah County. The MBPA consists of approximately 119,743 acres located in Township 4 South, Range 1 East; Township 4 South, Range 1-3 West; Township 5 South, Range 1 and 2 East; Township 5 South, Range 3 West; Township 8 South, Range 15-19 East; Township 9 South, Range 15-19 East; and Township 10 South, Range 15-18 East.

Surface ownership in the MBPA is approximately 87 percent federal (managed by the BLM), approximately 11 percent State of Utah (managed by State Institutional Trust Lands Administration [SITLA]), and approximately two percent private. Mineral interests are owned by the BLM (89 percent), the State of Utah (10 percent), and private interests (less than one percent). Lands with separate surface and mineral ownership, also known as "split estate lands," comprise approximately 18 percent of land within the MBPA.

Federal lands in the MBPA are under the jurisdiction of the BLM VFO. The VFO has determined that implementing the proposed development constitutes a federal action requiring the development of an Environmental Impact Statement (EIS). The EIS serves the purpose of disclosing and analyzing impacts from the Proposed Action, the No Action alternative, and the other developed alternatives.

Newfield holds federal, state, and private oil and gas leases within the MBPA. The leases have created contractual rights and obligations between Newfield and the U.S., the State of Utah, and private mineral owners. Newfield's purpose for the Proposed Action is to develop these leases and produce commercial quantities of oil and gas by expanding their ongoing oil and natural gas development and secondary recovery efforts within the MBPA.

Newfield's objective is to develop their leases and efficiently produce commercial and economic quantities of oil and gas in the MBPA. Newfield estimates that its plan could yield over 334.9 million barrels of oil (MMBO), 540,669 million cubic feet (MMCF) of natural gas, and 10,085 million barrels (Mbbl) of natural gas liquids (NGLs) from the Green River formation, and 6.9 trillion cubic feet (Tcf) of natural gas from the deep gas development through 2035. Newfield's need for the project is to fulfill its obligations and responsibilities under federal leases to explore, develop, and produce commercial quantities of oil and natural gas.

Purpose and Need

The BLM's purpose is to prevent undue and unnecessary environmental degradation while allowing development of the valid existing leases. The Federal Land Policy and Management Act (FLPMA) mandates that the BLM manage public lands on the basis of multiple use (43 United States Code [U.S.C.] 1701(a) (7)). Under Section 103 of FLPMA, multiple use is defined as meaning "a combination of balanced and diverse resources uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed,

wildlife and fish, and natural scenic, scientific and historic values". Minerals are identified as one of the principal uses of public lands (43 U.S.C. 1702(c)). The EIS is intended to facilitate the BLM decision-making process based on an evaluation of the anticipated impacts.

The BLM's need is to fulfill its responsibilities under the 1920 Mineral Leasing Act (MLA) to permit the development of mineral resources. The intent of the MLA and its implementing regulations are to allow and encourage lessees, or potential lessees, to explore for oil and gas underlying public lands. The mineral leases underlying the MBPA grant certain rights and obligations to the lessee to explore, develop, and produce oil and gas resources, allow ingress and egress, and identify a royalty interest to be paid to the federal and state governments on any production obtained. Private production from federal oil and gas leases are an integral component of the BLM's oil and gas leasing program under the authority of the MLA, as amended by FLPMA, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA).

EIS Decision Framework

This EIS is prepared in accordance with the National Environmental Policy Act (NEPA) and in compliance with the Council of Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), U.S. Department of Interior NEPA implementation regulations (40 CFR Part 36), and guidelines listed in the BLM NEPA Handbook (H-1790-1, BLM 2008). The BLM is the lead federal agency tasked with the preparation of the EIS.

This EIS evaluates four alternatives; the Proposed Action (Alternative A), No Action Alternative (Alternative B), Field-wide Electrification Alternative (Alternative C), and the Agency Preferred Alternative (Alternative D). It is notable that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities under each alternative are conceptual at this point. These locations have been illustrated on the alternative-specific maps for analytical and impact evaluation purposes only in this EIS. Actual locations for well pads, access roads, ROWs, and other surface facilities would be determined at the Project implementation phase.

The Record of Decision (ROD) associated with this EIS will approve an overall development plan for federal surface and minerals within the MBPA. The ROD could approve one of the alternatives or a combination of the alternatives.

Conformance with BLM Management Plans and Other Laws and Policy Considerations

Management objectives for lands under the authority of the VFO are contained within the Vernal ROD and approved Resource Management Plan (RMP) (BLM 2008a). The RMP allows for the exploration and development of oil and gas resources while protecting or mitigating impacts to other resource values.
The Proposed Action and related alternatives are deemed in conformance with management decisions made in the Vernal ROD and Approved RMP where applicable.

Utah Code 63J-80105.5 established the Uinta Basin Energy Zone which includes the MBPA. The highest management priority for these lands is responsible development of energy resources. SITLA has leased all of the state lands within the MBPA and permits on-going oil and gas production. These actions are consistent with SITLA's primary objective to fund the state school system. The Proposed Action and Alternatives C and D would allow for oil and gas production on federal leases and would be consistent with the objectives of Uinta Basin Energy Zone.

The Proposed Action and Alternatives C and D would be in compliance with the *Duchesne County General Plan*, as amended (Duchesne County 2005, 2007, 2012, 2013). The Plan supports responsible natural resource use and development and emphasizes the need to keep public lands open for oil and gas exploration and development under multiple-use and sustained yield principles.

The Proposed Action and Alternatives C and D would be in compliance with the *Uintah County General Plan 2005*, as amended (Uintah County 2005, 2012). The Plan supports oil and gas development, emphasizes responsible multiple-use of public lands, and optimizes utilization of public resources.

The Proposed Action and Alternatives C and D would be in compliance with Federal, State, and local laws and regulations. Increased development of oil and gas resources on public lands is consistent with FOOGLRA, Comprehensive National Energy Strategy announced by the U.S. Department of Energy in April 2008, the Energy Policy and Conservation Act (42 U.S.C. 6201), and the Energy Policy Act of 2005.

Newfield must obtain federal, state, and local permits and ROW grants, licenses, easement agreements, and other authorizing actions to proceed with all project-related development. Federal, state, county, and local regulatory and permitting actions required to implement any of the alternatives would generally be the same, regardless of which alternative is selected.

Internal Scoping and Issue Identification

The BLM conducted public and internal scoping to solicit input and identify environmental issues and concerns associated with the proposed project. The public scoping process was initiated on August 25, 2010, with the publication of a Notice of Intent (NOI) in the Federal Register. The BLM prepared a scoping information notice and provided copies to the public, other government agencies, and Tribes. These announcements included information on a public scoping meeting and open house, which was held at the County Commissioner's Office in Duchesne, Utah, on September 13, 2010, and at the Western Park Convention Center in Vernal, Utah, on September 20, 2010. The scoping meetings included participants from the BLM, Ashley National Forest, Uintah County Public Lands, Newfield, El Paso County, consultants, as well as local landowners. The official scoping period ended October 9, 2010.

Public response to the NOI and meetings included seven letters: two from federal agencies; one from a state agency; one from a county agency; and three from industry or private individuals. The following concerns were identified in the letters:

- Comprehensive air-quality analyses and region-wide air-quality modeling;
- Direct and indirect effects of water injection and hydrogen sulfide on gilsonite mining operations;
- Incorporation of operational flexibility into the Record of Decision and Final EIS;
- Recognition of valid existing lease rights within the Project Area by BLM;
- Explanation of the positive air quality impacts and reduction in emissions that would result from electrification;
- Limited BLM statutory or regulatory authority to regulate air quality or enforce air quality laws;
- Economic benefits to the local and state economies and SITLA;
- Conformance of the proposed project to the Vernal RMP;
- Direct, indirect, and cumulative impacts to Waters of the U.S.;
- Direct, indirect, and cumulative air quality impacts with an emphasis on fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), volatile organic compounds (VOC), and ozone;

- Protection of wetland, stream, and riparian resources;
- Alternatives for water treatment and produced water management;
- Protection of groundwater, drinking water, and irrigation water;
- Impacts of fugitive dust from construction and travel on unpaved roads;
- Impacts of noise from central facilities located near residences and wildlife in the MBPA;
- Analysis of proposed project development on water quality within Pariette Draw; and
- Potential introduction and expansion of noxious weeds in the MBPA.

The Notification of Availability for the Draft EIS was published on December 20, 2013. The Draft EIS was made available for a 45-day public comment period, which was subsequently extended by an additional 30 days at the request of the State of Utah. Three public meetings were held; one on January 21, 2014 in Salt Lake City, Utah, one on January 22, 2014 in Roosevelt, Utah, and one on January 23, 2014 in Vernal, Utah. A total of 22 unique comment letters or emails were received during the official comment period, and one letter was received after the comment period ended. The 23 comment letters or emails included one from a federal agency, one from the House of Representatives, one from a state agency, two from County governments, one from the proponent (Newfield), nine from other oil and gas industry representatives or trade groups, one from the proponent's outside legal counsel, one from a non-governmental organization, and six from private individuals. There were also 1,780 form letters received from members of the environmental community that expressed concern regarding ozone impacts, and 161 form letters received from Newfield Employees that expressed concern over impacts to their livelihoods from the Agency Preferred Alternative. A detailed list of substantive comments received and BLM's response to those comments is included in **Attachment 2** of the FEIS. However, comments largely focused on the following:

- Comments stating that the Agency Preferred Alternative was technically flawed and would not meet the purpose and need for the project;
- Comments asking the BLM to adopt the No Action Alternative;
- Comments asking the BLM to adopt the Proposed Action Alternative;
- Direct, indirect, and cumulative impacts to Waters of the U.S.;
- Direct, indirect, and cumulative air quality impacts with an emphasis on fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), volatile organic compounds (VOC), and ozone;
- Limited BLM statutory or regulatory authority to regulate air quality or enforce air quality laws;
- Economic benefits to the local and state economies and SITLA;
- Protection of wetland, stream, and riparian resources;
- Alternatives for water treatment and produced water management;
- Protection of groundwater, drinking water, and irrigation water;
- Analysis of proposed project development on water quality within Pariette Draw; and
- Surface restrictions in the Pariette Wetlands ACEC and *Sclerocactus* core conservation areas.

ALTERNATIVES

DEVELOPMENT ACTIVITIES COMMON TO ALL ALTERNATIVES

Newfield is proposing to expand their ongoing oil and natural gas development and secondary recovery within the MBPA using waterflood methods and deep gas operations. Waterflood methods involve the

injection of produced water and freshwater (through formerly producing or new wells) into the oil-producing geologic formation. Nearby actively producing wells extract the fluids through the formation as the water displaces the oil. In addition, portions of the MBPA along the northwest and southern Project boundaries would be subject to expansion away from existing development.

Newfield proposes to drill new wells as infill to all productive formations, including but not limited to, the middle and lower members of the Green River formation and upper member of the Colton Formation. The Green River oil wells would be drilled to a total depth of between 4,500 and 6,500 feet below ground surface (bgs), and the proposed deep gas wells would be drilled to a total depth of between 13,000 and 18,000 feet bgs.

Well density in the MBPA would vary based on geologic characteristics of the formation being targeted for development. The range of downhole well densities expected at this time is one well per 20 acres (i.e., middle member of the Green River Formation) to one well per 40 acres (i.e., middle and lower members of the Green River Formation). The ultimate number and density of wells would be defined through future drilling and would vary by alternative. Newfield would use directional drilling and multiple well pad drilling techniques to develop these resources in a manner that would limit the number of well pads or surface locations (i.e., surface density) to a maximum of one well pad per 40 acres.

The number of wells per well pad would vary based on downhole spacing, technical feasibility, and the geologic characteristics of the targeted formation. Some well pad locations would host a single well and others may have multiple wells drilled from a single well pad.

The life cycle of an individual well and its associated facilities/required infrastructure (e.g., roads, pipelines, and compressor stations) is composed of seven primary phases: (1) preconstruction, (2) construction, (3) drilling, (4) completion, (5) interim reclamation, (6) production and maintenance, and (7) final reclamation and abandonment. Section 2.2 of the Final EIS describes in more detail these project design features that are common to all alternatives. A brief description of each alternative is provided in the following sections. Detailed, alternative-specific information is provided in Sections 2.3 through 2.6 of the EIS. Only minor changes were made to the Proposed Action between the Draft EIS and Final EIS.

Alternative A – The Proposed Action

The Proposed Action is derived from Newfield's proposed plan for oil and gas development. The Proposed Action includes the following primary components:

- Development of up to 750 Green River oil wells on 40-acre surface and downhole spacing drilled from new 2-acre well pads, all of which would be converted into waterflood injection wells after approximately 3 years of production;
- Development of up to 2,500 Green River oil wells on 20-acre downhole spacing that would be vertically, directionally, or horizontally drilled from existing and/or proposed 40-acre surface spaced Green River oil well pads, consistent with current State spacing requirements;
- Development of up to 2,500 vertical deep gas wells on 40-acre surface and downhole spacing drilled from new 3-acre well pads, which would be constructed adjacent to Green River oil well pads to reduce new surface disturbance and use existing utility infrastructure and access roads;

- Construction of approximately 243 miles of new 100-foot wide ROW that would be used for new road construction (40-foot width) and pipeline installation (60-foot width). Up to 70-foot wide expansion along approximately 363 miles of existing access road ROW that would be used for road upgrade (10-foot width) and pipeline installation (60-foot width);
- Construction of 20 new compressor stations for deep gas well development;
- Expansion of three existing Green River oil well compressor stations and construction of one new compressor station for gas associated with Green River oil well development;
- Construction of a 50 MMscf/d centralized gas processing plant;
- Construction of seven new and expansion of six existing water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of up to 12 GOSPs for oil and produced water collection;
- Development of one fresh water collector well for waterflood operations; and
- Construction of six water pump stations.

Newfield currently operates approximately 3,395 oil and gas wells in the MBPA and proposes to drill associated wells at an average rate of 360 wells per year until the resource base is fully developed. Under this drilling scenario, construction, drilling, and completion of up to 5,750 wells would occur for approximately 16 years. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated life of project (LOP) under the Proposed Action would be from 41 to 51 years.

Alternative B – No Action

Under the No Action Alternative, the proposed oil and gas infill development project on public land surface and/or federal mineral estates as described in the Proposed Action would not be implemented. However, proposed oil well development would likely continue on State and private lands or minerals within the MBPA, subject to the approval of UDOGM and/or the appropriate private land owner. This EIS evaluates proposed development on State and private lands or minerals under the No Action alternative (and all alternatives) but the BLM does not have jurisdiction over State and private land or minerals. Therefore, the ROD for this EIS will not include decisions specific to State and private lands or minerals. Reasonable access across BLM-administered surface to proposed well pads and facilities on State and private lands or minerals could also occur under the No Action Alternative, as allowed by Federal regulations. Development, production, and maintenance activities for wells approved under the August 2005 ROD for the Castle Peak and Eight Mile Flat Oil and Gas Expansion EIS would also continue on BLM-administered lands.

It is estimated that approximately 241 previously approved or planned wells remain to be drilled on BLM-administered lands in addition to the 3,395 existing wells within the MBPA (as of December 31, 2011).

In addition to the approved 241 wells that have not yet been drilled, an additional approximately 547 oil and gas wells would be developed on State and private lands or minerals in the MBPA under the No Action Alternative, for a total of 788 producing wells. Newfield proposes to drill wells at an average rate of up to

360 wells per year. Under this drilling scenario, construction, drilling, and completion of all 788 wells would occur over an approximately 2.2-year period. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated LOP under the No Action Alternative would be approximately 28 to 38 years. Only minor edits were applied to the No Action Alternative between the Draft and Final EIS.

Key components of the No Action Alternative include the following:

- Development of up to 128 Green River oil wells on 40-acre surface and downhole spacing drilled from new 2-acre well pads, all of which would eventually be converted into waterflood injection wells;
- Development of up to 419 Green River oil wells and/or deep gas wells on 20-acre downhole spacing that would be vertically, directionally, or horizontally drilled from existing and/or proposed 40-acre surface spaced Green River oil well pads with average surface disturbance of about 0.2 acres per pad;
- Development of up to 241 additional Green River oil wells from other previously approved and planned Newfield oil and natural gas development projects. For purposes of analysis, approximately half of the wells are assumed to be vertical wells drilled on existing well pads and half are assumed to be vertical wells with average surface disturbance of about 0.2 acres per pad;
- Construction of approximately 23 miles of new 70-foot wide ROW that would be used for new road construction (40-foot width) and pipeline installation (30-foot width).
- Construction of approximately 45 miles of 70-foot wide ROW that would be used for up to 40-foot wide expansion of existing access road ROW for co-located road upgrade (10-foot width) and pipeline installation (30-foot width); ;
- Construction of up to two (2) new 8,000 hp compressor stations;
- Construction of a 50 MMscf/d centralized Green River oil well gas processing plant;
- Construction of one new water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of one new GOSP for oil and produced water collection; and
- Construction of one water pump station.

Alternative C – Field-wide Electrification

Alternative C was developed in response to air quality issues raised during the public and agency scoping process. The principal component of this alternative entails a phased field-wide electrification system that would be integrated in the MBPA over an estimated 7-year period. This alternative would incorporate the same construction and operational components described in **Section 2.2** of the Final EIS (Development Activities Common to all Alternatives), except that gas-driven motors would be converted to electric motors as field electrification is phased into the MBPA.

Under Alternative C, the same number of oil and gas wells (5,750) would be developed on BLM, State, and private lands as described under the Proposed Action. Under this drilling scenario, construction, drilling, and completion of all 5,750 wells would occur for approximately 16 years. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated LOP under Alternative C would be 41 to 51 years. Modifications to Alternative C as a result of public comments on the draft included clarification that corridor widths for distribution lines would require short- and long-term widths of 60 feet, which resulted in substantially more surface disturbance than Alternatives A, B, or D. In addition, Newfield provided comments that the cost of field electrification would cause the project to be economically infeasible, and Newfield would not be able to meet their purpose and need for the project.

Alternative C includes the following primary components:

- Development of up to 750 Green River oil wells on 40-acre surface and downhole spacing drilled from new 2-acre well pads, all of which would be converted into waterflood injection wells after approximately 3 years of production;
- Development of up to 2,500 Green River oil wells on 20-acre downhole spacing that would be vertically, directionally, or horizontally drilled from existing and/or proposed 40-acre surface spaced Green River oil well pads, consistent with current State spacing requirements;
- Development of up to 2,500 vertical deep gas wells on 40-acre surface and downhole spacing drilled from new 3-acre well pads, which would be constructed adjacent to Green River oil well pads to reduce new surface disturbance and use existing utility infrastructure and access roads;
- Construction of approximately 243 miles of new 150-foot wide ROW that would be used for new road construction (40-foot width), pipeline installation (60-foot width), and distribution line construction (50-foot width). Up to 150-foot wide expansion along approximately 363 miles of existing access road ROW that would be used for road upgrade (40-foot width), pipeline installation (60-foot width), and distribution line construction (50-foot width); Construction of 20 new compressor stations for deep gas well development;
- Expansion of three existing Green River oil well compressor stations and construction of one new compressor station for gas associated with Green River oil well development;
- Construction of a 50 MMscf/d centralized gas processing plant;
- Construction of seven new and expansion of six existing water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of up to 12 GOSPs for oil and produced water collection;
- Development of one fresh water collector well for waterflood operations;
- Construction of six water pump stations; and
- Phased field-wide electrification consisting of construction of approximately 34 miles of overhead, cross-country 69kV transmission line (pole line), 156 miles of distribution lines, and construction of 11 generating stations (also known as substations).

Alternative D – Resource Protection (Agency Preferred Alternative)

In accordance with CEQ regulations, the BLM is required to identify a preferred alternative in the EIS if one or more exists. Alternative D, the Resource Protection Alternative, is the Agency Preferred Alternative. Alternative D was developed to respond to issues raised during scoping about reducing potential impacts to sensitive resource and land uses. The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the project area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments are all contained within the range of alternatives considered in the Final EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

For the MBPA, the primary objective of the Resource Protection Alternative is to meet the purpose and need for the Project while 1) protecting the relevant and important values of the Pariette Wetlands Area of Critical Environmental Concern (ACEC); 2) minimizing the amount of new surface disturbance and habitat fragmentation within and around USFWS proposed Level 1 and 2 Core Conservation Areas (for two federally-listed plant species: the Uinta Basin hookless cactus [*Sclerocactus wetlandicus*] and the Pariette cactus [*Sclerocactus brevispinus*]); 3) precluding new well pads (with the exception of Newfield's proposed water collector well) and minimizing new surface disturbance (roads or pipelines) within 100-year floodplains; 4) precluding new well pads, pipelines, or roads within riparian habitats; and 5) minimizing overall impacts from the proposed oil and gas development through the use of directional drilling technology. Detailed information on surface disturbance restrictions under Alternative D is included in **Sections 2.6.1 – 2.6.3** of the Final EIS.

Advancements in directional drilling technology have increased the maximum vertical section displacement for the shallow Green River Formation to distances of 800 to 1,200 feet though significant technical and economic challenges are encountered in those wells (increased equipment wear and tear resulting in more frequent workover or replacement cycles and associated increased costs, and reduction in areal waterflood sweep).

Alternative D includes the following primary components (see **Figure 2-4 – Attachment 1**):

- Development of approximately 750 new Green River vertical oil wells to be drilled from a combination of new, small and large well pads, all of which would eventually be converted into waterflood injection wells;

- Development of approximately 2,500 new deep gas wells that would be vertically or directionally drilled from a combination of new and existing, large well pads;

- Development of approximately 2,500 new 20-acre downhole spacing Green River oil production wells to be directionally drilled from a combination of new or existing, small and large well pads.

- Construction of approximately 226 miles of new 100-foot wide ROW that would be used for new road construction (40-foot width) and pipeline installation (60-foot width). Up to 70-foot wide

expansion along approximately 318 miles of existing access road ROW that would be used for road upgrade (10-foot width) and pipeline installation (60-foot width);

- Construction of 20 new compressor stations for deep gas well development;
- Expansion of three existing Green River oil well compressor stations and construction of one new compressor station for gas associated with Green River oil well development;
- Construction of up to one 50-MMscf/d centralized Green River oil well gas processing plant;
- Construction of up to 13 gas driven water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of up to 12 GOSPs for oil and produced water collection;
- Development of one fresh water collector well for waterflood operations; and
- Construction of six water pump stations.

Comparison Summary of Design Features Among Alternatives

Table ES-1 summarizes the number of well pads, miles of access road, miles of pipeline, production facilities, and other design or project features that would occur under each alternative.

Table ES-1 Design Feature Summary Comparison among Alternatives

ALTERNATIVE		ALTERNATIVE A - PROPOSED ACTION			ALTERNATIVE B - NO ACTION ALTERNATIVE			ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION			ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE		
Project Feature	**Size (disturbance width [feet] or acres/facility)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)[1]**
Well /Well Pad Count and Surface Disturbance Estimate													
New Green River Oil Well Pads and Vertical Wells on 40-acre Surface Density and Downhole Spacing	2.0 acres per well pad	750	1,500	750	128	256	128	750	1,500	750	--	--	--
New Green River Oil Well on 20-acre Downhole Spacing Directionally Drilled from Existing or New Well Pads	0.2 acre per well	2,500	500	500	--	--	--	2,500	500	500	--	--	--
New Deep Gas Well Pads and Vertical or Directional Wells on 40-acre Surface Density and Downhole Spacing	3.0 acres per well pad	2,500	7,500	2,500	--	--	--	2,500	7,500	2,500	--	--	--
New Green River Oil and/or Deep Gas Wells on 20-acre Downhole Spacing Directionally Drilled from Existing or New Well Pads	0.2 acre per well	--	--	--	419	84	84	--	--	--	--	--	--
Wells Remaining to be Drilled under other Approved or Proposed Newfield Projects	2.0 acres[2] per well pad	--	--	--	241	48	48	--	--	--	--	--	--
Existing, Large Well Pads													
Existing 40-ac Spacing Vertical oil Wells Located on Existing, Large Well Pads	2.0 acres of existing pad disturbance	--	--	--	--	--	--	--	--	--	497 existing pads	--	--
New Vertical Gas Wells Located on Existing, Large Well Pads	0.8 acres per well	--	--	--	--	--	--	--	--	--	497 new wells	398	--
New Directional Gas Wells Located on Existing, Large Well Pads	0.2 acres per new well	--	--	--	--	--	--	--	--	--	1,491 new wells	298	--
New 20-ac Spacing Directional 20-ac Oil Wells Located on Existing, Large Well Pads	0.2 acres per new well	--	--	--	--	--	--	--	--	--	497 new wells	99	--

ALTERNATIVE		ALTERNATIVE A - PROPOSED ACTION			ALTERNATIVE B - NO ACTION ALTERNATIVE			ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION			ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE		
Project Feature	**Size (disturbance width [feet] or acres/facility)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)[1]**
Existing, Small Well Pads													
Existing 40-ac Spacing Vertical Oil Wells Located on Existing, Small Well Pads	2.0 acres of existing pad disturbance	--	--	--	--	--	--	--	--	--	1,041 existing pads	--	--
New Directional 20-ac Spacing Oil Wells Located on Existing, Small Well Pads	0.2 acres per new well	--	--	--	--	--	--	--	--	--	1,041 new wells	208	--
Proposed, Large Well Pads													
New 40-ac Spacing Vertical Oil Wells Located on Proposed, Large Well Pads	2.0 acres per well	--	--	--	--	--	--	--	--	--	240 new pads	480	240
New Vertical Gas Wells Located on Proposed, Large Well Pads	0. 8 acres per well	--	--	--	--	--	--	--	--	--	240 new wells	192	--
New Directional Gas Wells Located on Proposed, Large Well Pads	0.2 acres per well	--	--	--	--	--	--	--	--	--	720 new wells	144	--
New Directional 20-ac Oil wells Located on Proposed, Large Well Pads	0.2 acres per well	--	--	--	--	--	--	--	--	--	240 new wells	48	--
Proposed, Small Well Pads													
New 40-ac Spacing Vertical Oil Wells Located on Proposed, Small Well Pads	2.0 acres per well	--	--	--	--	--	--	--	--	--	1,005 new wells	2,010	1,005
New 20-ac Spacing Directional 20-ac Oil Wells Located on Proposed, Small Well Pads	0.2 acres per well	--	--	--	--	--	--	--	--	--	1,005 new wells	201	--
Subtotal	**--**	**5,750 wells**	**9,500**	**3,750**	**788 wells**	**388**	**260**	**5,750 wells**	**9,500**	**3,750**	**5,750 wells***	**4,078**	**1,245**
Access Roads													
New Roads Co-located with Pipelines	40 feet[4]	243 miles	1,178	1,178	23.5 miles	114	114	243 miles	1,178	1,178	226 miles	1,096	1,096
Existing Roads with New Pipelines	10 feet[5]	363 miles	440	440	45 miles	55	55	363 miles	440	440	318 miles	385	385
Subtotal	**--**	**606 miles**	**1,618**	**1,618**	**68 miles**	**169**	**169**	**606 miles**	**1,618**	**1,618**	**544 miles**	**1,482**	**1,482**

ALTERNATIVE		ALTERNATIVE A - PROPOSED ACTION			ALTERNATIVE B - NO ACTION ALTERNATIVE			ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION			ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE		
Project Feature	**Size (disturbance width [feet] or acres/facility)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)[1]**
Total Number of New Well Pads	**--**	**3,250 new pads**	**--**	**--**	**369 new pads**	**--**	**--**	**3,250 new pads**	**--**	**--**	**1,245 new pads**	**--**	**--**
Pipelines and Utility Lines													
Pipelines Co-located with New Roads	60 feet	243 miles	1,767	736	--	--	--	243 miles	1,767	736	226 miles	1,644	685
Pipelines Co-located with Existing Roads	60 feet	363 miles	2,640	1,100[7]	--	--	--	363 miles	2,640	1,100	318 miles	2,313	963
Pipelines Co-located with New Roads	30 feet				23.5 miles	85	57		--	--	--	--	--
Pipelines Co-located with Existing Roads	30 feet	--	--	--	45 miles	164	109	--	--	--	--	--	--
Proposed Transmission Lines	30 feet	--	--	--	--	--	--	35 miles	255	255	--	--	--
Proposed Distribution Lines	20 feet	--	--	--	--	--	--	606 miles	3672	3672	--	--	--
Subtotal	**--**	**606 miles**	**4,407**	**1,836**	**68 miles**	**249**	**166**	**796**	**8,334**	**5,673**	**544**	**3,958**	**1,647**
Central Facilities													
Compressor Stations (New/Upgrades)	10 acres	24	226	226	2	20	20	24	226	226	24	226	226
Gas Processing Plants	10.0 acres	1	10	10	1	10	10	1	10	10	1	10	10
Water Treatment and Injection Facilities	8/5 acres[1]	13	86	86	1	7	7	13	86	86	13	867	86
Gas and Oil Separation Plants (GOSPs)	22.0 acres	12	264	264	1	22	22	12	264	264	12	264	264
Fresh Water Collector Well	1.7 acres	1	**1.7**	**.7**	1	**1.7**	**.7**	1	**1.7**	**.7**	1	1.7	1.7
Pump Stations	3/5 acres	6	18	18	1	5	5	6	18	18	6	18	18
Generating Stations	5.0 acres	--	--	--	--	--	--	11	55	55	--	--	--
Subtotal	**--**	**57**	**604**	**604**	**7**	**64**	**64**	**68**	**659**	**659**	57	604	604
Total New Disturbance	**--**	**--**	**16,129**	**7,808**	**--**	**870**	**659**	**--**	**20,112**	**10,173**	**--**	**10,122**	**4,978**
Life of Project (LOP)		41 to 51 Years			28 to 38 Years			41 to 51 Years			41 to 51 Years		

AFFECTED ENVIRONMENT

The MBPA is located within the Uinta Basin of the Colorado Plateau physiographic province. The basin is a bowl-shaped structural and sedimentary feature that trends roughly east to west, has a maximum width of about 115 miles, and covers an area of approximately 10,890 square miles. The basin is bounded on the north by the Uinta Mountains and on the east by the Douglas Creek Arch, with portions of the Wasatch Range and the Roan Cliffs forming its southern and western boundaries.

Elevations within the MBPA ranges from approximately 4,632 feet above mean sea level (amsl) in the eastern portion near the Green River, to approximately 6,867 feet amsl in the southwestern portion near Gilsonite Draw. Numerous drainages transect the MBPA, including Wells Draw, Castle Peak Draw, Petes Wash, Sheep Wash, Big Wash, and a number of other unnamed ephemeral features. These drainages, in combination with the plateaus of Pariette Bench and Eightmile Flat, create a pattern of uplands and lowlands oriented southwest to northeast.

The vegetation within the MBPA and surrounding region consists of typical Intermountain Basin shrubland associations. This region mixes an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors to produce a mosaic of floristic components and associated natural habitats. These communities are often mixed, transitional, or widely distributed.

The MBPA encompasses approximately 119,743 acres of land within southeast Duchesne County and southwest Uintah County. The MBPA spans a distance of approximately 25 miles east to west and 9 miles north to south. The Town of Vernal is approximately 33 miles northeast of the MBPA boundary, and Myton, Utah, is located approximately 5.5 miles to the north. Land ownership in the MBPA is approximately 87 percent Federal (managed by the BLM), approximately 11 percent State of Utah (managed SITLA), and approximately 2 percent private. Mineral interests are owned by the BLM (89 percent), the State of Utah (10 percent), and private interests (less than 1 percent). Lands with separate surface and mineral ownership, also known as "split estate lands," comprise approximately 18 percent of land within the MBPA.

Chapter 3 of the Final EIS describes the affected environment of the MBPA. Resources and resource uses described in this chapter include those identified by the BLM's IDT as being potentially affected by the project, as well as the substantive issues of concern brought forward during internal and public scoping. Affected environment information within Chapter 3 is intended to establish a baseline for comparison of the direct, indirect, and cumulative impacts of each of the alternatives.

ENVIRONMENTAL CONSEQUENCES

Chapter 4 describes the direct and indirect effects of implementing the alternatives on the affected environment as described in Chapter 3. The resource-specific effects of the alternatives are evaluated both quantitatively and qualitatively, depending on available data and the nature of the resource being analyzed. A summary of the Chapter 4 impact analyses is provided in **Table ES-2**.

TABLE ES-2 SUMMARY OF ANTICIPATED IMPACTS BY ALTERNATIVE

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
Air Quality	The Proposed Action would result in concentrations of criteria pollutants below the NAAQS. Project specific ozone impacts were modeled using the ARMS platform. Project specific emissions plus baseline cause some NAAQS exceedances; however, project specific are at most 2% of the baseline. Ozone emissions would be mitigated according to the BLM adaptive management strategy. Non-carcinogenic REL, RfC, and State of Utah TSL impacts would be below all applicable significance criteria for Acrolein, Benzene and Formaldehyde. All other HAPs are expected to be below the significance thresholds as well. Increases in pollutant concentrations are not expected to exceed PSD Criteria. Acid deposition is not expected to exceed impact thresholds at Class I or Class II areas; however the deposition analysis threshold was exceeded at the closest Class I and II areas for nitrogen. Predicted impacts at all lakes would be a less than 10 percent change in acid neutralizing capacity. One day exceeded a 1.0 deciview change in visibility at the closest Class I area; however the 98th percentile was less than the 1.0 limit of acceptable change.	Qualitative air quality impacts under the No Action Alternative would be less than or similar in nature to those described for the Proposed Action. Near-field impacts are expected to be similar to the Proposed Action given similar equipment at individual facilities, although there is an overall reduction in the number of facilities. However, it is possible that near-field impacts under Alternative B would be greater than those for Alternative A because not all of the ACEPMs for Alternative A would be implemented under the No Action Alternative. Since the emissions are less under Alternative B than those for the Proposed Action, the overall visual air quality and AQRV impacts would be the same or less than those for the Proposed Action.	Alternative C would result in concentrations of criteria pollutants below the NAAQS. Ozone emissions would be mitigated according to the BLM adaptive management strategy. Non-carcinogenic REL, RfC, and State of Utah TSL impacts would be below all applicable significance criteria for Acrolein, Benzene and Formaldehyde. All other HAPs are expected to be below the significance thresholds as well. Since the emissions are less under Alternative C than those for the Proposed Action, the overall visual air quality and AQRV impacts would be the same or less than those for the Proposed Action.	Qualitative near-field air quality impacts would be similar to those described under the Proposed Action given similar equipment at individual facilities although there is an overall reduction in the number of facilities. Since the emissions are less under Alternative D than those for the Proposed Action, the overall visual air quality and AQRV impacts would be the same or less than those for the Proposed Action.

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
Geology and Minerals	Potential impacts to geologic and mineral resources from the Proposed Action (and alternatives) include changes to local physiography and topography; decreased slope stability; depletion of oil and natural gas resources; and interference with potential mining of gilsonite, tar sands, oil shale, and other leasable, locatable, and salable minerals within the MBPA. Potential impacts to oil and natural gas resources include the depletion of these resources due to active extraction. While the ultimate recovery of oil and natural gas from the MBPA at full development is unknown, it is estimated that the maximum development of the 5,750 wells under the Proposed Action would result in a potential recovery of over 335 MMBO, 540,669 MMCF of natural gas, and 10,085 Mbbl of NGLs from the Green River Formation over the LOP. In addition, development of deep gas wells could yield an additional estimated 6.9 Tcf of natural gas. These oil and gas resources would be removed from the subsurface and no longer would be available for extraction.	Impacts to geological and mineral resources under the No Action Alternative would be similar in nature to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative because only 788 new oil and gas wells would be developed on BLM, State and private lands in the MBPA. Development of the 788 wells proposed under the No Action Alternative would result in a potential recovery of an estimated 64 MMBO over the LOP, decreasing the presumed total available oil reserves in the Uinta Basin by approximately 1.2 percent. In addition, implementation of the No Action Alternative would yield approximately 1.2 Tcf of natural gas over the LOP, thus decreasing the total estimated reserves of natural gas in the Uinta Basin by approximately 4.6 percent. Correspondingly, impacts to physiography and topography; geologic hazards; and gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be proportionately less under Alternative B. Under the No Action Alternative, approximately 54 acres (0.2 percent) of KOSLAs and 38 acres (0.3 percent) STSAs within the	Impacts to geological and mineral resources Alternative C would be nearly identical in nature and scope to those described for the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. Correspondingly, impacts to physiography and topography; geologic hazards; oil and gas resources; and gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be identical to those described for the Proposed Action.	Impacts to geological and mineral resources under Alternative D would be similar in nature to those described for the Proposed Action. However, potential impacts would be less under Alternative D as there would be substantially less surface disturbance as a result of the use of multi-well pads and surface disturbance restrictions in sensitive areas. While the ultimate recovery of oil and natural gas from the MBPA at full development is unknown, it is estimated that the maximum development of the 5,750 wells under Alternative D would result in a potential recovery of over 335 MMBO, 540,669 MMCF of natural gas, and 10,085 Mbbl of NGLs from the Green River Formation over the LOP. In addition, development of deep gas wells could yield an additional estimated 6.9 Tcf of natural gas. These oil and gas resources would be removed from the subsurface and no longer would be available for extraction. Correspondingly, impacts to physiography and topography; geologic hazards; and gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be similar to the Proposed Action, but with substantially less surface disturbance.

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
		MBPA would be impacted by surface disturbance.		
Paleontology	Potential indirect adverse impacts on paleontological resource (under any alternative) are most likely to occur where maintenance or future-proposed actions occur in areas containing the bedrock strata of the Green River and Uinta formations. These activities include the grading of access roads, the blading of production-related areas of well pads and infrastructure components (i.e., compressor stations, gas processing plant, pump stations, etc.). For the Proposed Action, a total of 10,066 acres of Potential Fossil Yield Classification System (PFYC) Class 2, 3, and 5 lands (approximately 8 percent of the MBPA) would be involved in surface-disturbing activities. Approximately 67 percent (6,691 acres) of the disturbance from the Proposed Action would occur on Class 5 land (i.e., land having the highest potential for fossil material). In addition, approximately 23 percent of the proposed disturbance would occur on Class 2 land (i.e., land having the lowest potential for fossil material), and approximately 10 percent would occur on Class 3 land (i.e., land having moderate or unknown potential for fossil material). The Proposed Action	Impacts to paleontological resources under the No Action Alternative would be similar in nature and scope to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative because only 788 new oil and gas wells would be developed on BLM, State, and private lands in the MBPA. The overall surface disturbance would be approximately 870 acres. Under Alternative B, impacts to fossil resources would result in approximately 465 acres of surface disturbance on PFYC Class 2, 3, and 5 lands. Approximately 243 acres (52 percent) of the potential disturbance for Alternative B would occur on Class 5 land. Indirect adverse impacts to paleontological resources associated with an expanded road network would result from 23 miles of new roads.	Impacts similar in nature and scope to the Proposed Action.	Impacts to paleontological resources would be similar and nature and scope to the Proposed Action. However, there would be less surface disturbance and potential impacts to paleontological resources as a result of the use of multi-well pads and surface disturbance restrictions in sensitive areas.

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	would result in the second highest total surface disturbance in paleontological sensitive land (10,066 acres), second to Alternative C, which would involve a total of approximately 10,621 acres.			
Soils	Under the Proposed Action impacts include to soil resources include soil exposure and compaction, loss of soil productivity and topsoil, increased susceptibility of soil to erosion, and increased sediment yield. An estimated annual sediment load of 254 tons (above the natural background erosion) is expected to be delivered to the drainages in the MBPA over the long-term (production phase).	Under the No Action Alternative, impacts would be similar to the Proposed Action but reduced in scope. An estimated annual sediment load of 189 tons (above the natural background erosion) is expected to be delivered to the drainages over the long-term (production phase).	Under Alternative C, impacts are similar to the Proposed Action. An estimated annual sediment load of 254 tons (above the natural background erosion) is expected to be delivered to the drainages over the long-term (production phase).	Under Alternative D, impacts are similar to the Proposed Action. However, there would be less surface disturbance and impacts to soils as a result of the use of multi-well pads and surface disturbance restrictions in sensitive areas.
Water Resources	Under the Proposed Action impacts to water resources would include reductions in available surface water and groundwater resources and increased TDS, selenium, and boron concentrations in surface waters. During the Production Phase, this alternative would increase surface water use, ground water use, and sediment yield by 382 acre-feet/year, 1,063 acre-feet, year, and 7 tons/year, respectively, over existing conditions.	Under the No Action Alternative, impacts to water resources would be similar to the Proposed Action but reduced in scale. During the Production Phase, this alternative would increase surface water use, ground water use, and sediment yield by 369 acre-feet/year, 0 acre-feet, year, and 0 tons/year, respectively, over existing conditions.	Under Alternative C impacts to water resources would be similar to the Proposed Action. During the Production Phase, this alternative would increase surface water use, ground water use, and sediment yield by 382 acre-feet/year, 1,063 acre-feet, year, and 7 tons/year, respectively, over existing conditions.	Under Alternative D, impacts are similar to the Proposed Action. However, there would be substantially less surface disturbance and therefore, less sediment yield as a result of the use of multi-well pads and surface disturbance restrictions in sensitive areas. Similarly, there would be less impacts to wetlands and riparian areas given the additional mitigation measures for these resources under Alternative D.
Vegetation	The Proposed Action would result in the direct, short-term loss of approximately 16,129 acres of vegetation; increased potential for	The No Action Alternative would result in the direct, short-term loss of approximately 870 acres of vegetation; increased potential for	Alternative C would result in the direct, short-term loss of approximately 19,294 acres of vegetation; increased potential for	Alternative D would result in the direct, short-term loss of approximately 9,940 acres of vegetation; increased potential for

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	noxious weed invasion; exposure of soils to elevated erosion and soil compaction; shifts in overall species composition and/or changes in plant density; potential loss of productive agricultural land for the LOP; increased potential for wildfires; increased fugitive dust which if deposited on plants could inhibit photosynthesis and transpiration; and the short-term loss of 677 acres of wetland vegetation. Potential impacts to wetland areas would result from increased sediment loads and potential for contamination from accidental spills.	noxious weed invasion; exposure of soils to elevated erosion and soil compaction; shifts in overall species composition and/or changes in plant density; potential loss of productive agricultural land for the LOP; increased potential for wildfires; increased fugitive dust which if deposited on plants could inhibit photosynthesis and transpiration; and the short-term loss of 32 acres of wetland vegetation. Potential impacts to wetland areas would result from increased sediment loads and potential for contamination from accidental spills. Indirect impacts to vegetation communities would be lowest under the No Action Alternative as substantially lower level of development would occur when compared to the action alternatives.	noxious weed invasion; exposure of soils to elevated erosion and soil compaction; shifts in overall species composition and/or changes in plant density; potential loss of productive agricultural land for the LOP; increased potential for wildfires; increased fugitive dust which if deposited on plants could inhibit photosynthesis and transpiration; and the short-term loss of 857 acres of wetland vegetation. Potential impacts to wetland areas would result from increased sediment loads and potential for contamination from accidental spills. Disturbance and project activity within the ROW for the proposed transmission lines would represent an increased potential for the spread of noxious weeds over other alternatives.	noxious weed invasion; exposure of soils to elevated erosion and soil compaction; shifts in overall species composition and/or changes in plant density; potential loss of productive agricultural land for the LOP; increased potential for wildfires; increased fugitive dust which if deposited on plants could inhibit photosynthesis and transpiration; and the short-term loss of 403 acres of wetland vegetation. Potential impacts to wetland areas would result from increased sediment loads and potential for contamination from accidental spills. Alternative D would result in the lowest direct and indirect impacts to vegetation of all action alternatives.
Range	Under all alternatives, the primary direct impact to livestock use in the MBPA would be the amount of available forage lost as a result of proposed ground-disturbing actions. Under the Proposed Action, approximately 16,129 acres of vegetation would be removed within the MBPA as a result of new surface disturbance-related activities, 15,137 acres of which would occur within portions of the six grazing allotments contained wholly or partially within the	Under the No Action Alternative, approximately 870 acres of vegetation would be removed within the MBPA as a result of new surface disturbance-related activities, 792 acres of which would occur within portions of the six grazing allotments contained wholly or partially within the MBPA. This would result in a total loss of approximately 88 AUMs, which is approximately 95 percent less than what would be expected under the Proposed Action.	Direct and indirect impacts to range resources under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would result in 18,395 acres of surface disturbance due to the installation of transmission lines and substations. This would result in a total loss of approximately 2,043 AUMs, which is approximately 18 percent greater than what would be expected under the Proposed Action.	Direct and indirect impacts to vegetation resources under Alternative D would be similar in nature and scale to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D because the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology. Implementation of Alternative D would result in the direct disturbance

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	MBPA. This would result in a total loss of approximately 1,682 AUMs.			of 9,531 acres of vegetation within BLM designated grazing allotments. This would result in a total loss of approximately 1,059 AUMs, which is approximately 18 percent less than that of the Proposed Action.
Fish and Wildlife	Under the Proposed Action potential impacts include the disturbance of approximately 11,163 acres of suitable wildlife habitat. Habitat loss and fragmentation would result from the disturbance of approximately 14,403 acres of year-long crucial and 273 acres of year-long substantial pronghorn habitats; 700 acres of substantial winter, 232 acres of substantial year-long and 89 acres of crucial year-long mule deer habitats; and 1,511 acres of substantial winter and 1,011 acres of crucial year-long elk habitats. Indirect impacts would include decreased value and degradation of habitat adjacent to disturbed areas and roadways; increased potential for wildlife harassment and poaching; increased potential for vehicle collisions; potential for additional stress from noise and human activity during the reproductive period resulting lowered fecundity or nest abandonment; increased intra- and inter-specific competition for resources; and exposure to contaminants located in reserve pits.	Under the No Action Alternative potential impacts include the disturbance of approximately 683 acres of suitable wildlife habitat. Habitat loss and fragmentation would result from the disturbance of approximately 656 of year-long crucial pronghorn habitat; 55 acres of substantial winter, 66 acres of substantial year-long and <1 acre of crucial year-long mule deer habitats; and 61 acres of substantial winter and 104 acres of crucial year-long elk habitats. Indirect impacts would include decreased value and degradation of habitat adjacent to disturbed areas and roadways; increased potential for wildlife harassment and poaching; increased potential for vehicle collisions; potential for additional stress from noise and human activity during the reproductive period resulting lowered fecundity or nest abandonment; increased intra- and inter-specific competition for resources; and exposure to contaminants located in reserve pits. Indirect impacts would be smallest in magnitude when compared to the action alternatives as the No Action Alternative represents the smallest	Under Alternative C potential impacts include the disturbance of approximately 14,432 acres of suitable wildlife habitat. Habitat loss and fragmentation would result from the disturbance of approximately 14,403 acres of year-long crucial and 273 acres of year-long substantial pronghorn habitats; 700 acres of substantial winter, 232 acres of substantial year-long and 89 acres of crucial year-long mule deer habitats; and 1,511 acres of substantial winter and 1,011 acres of crucial year-long elk habitats. Indirect impacts would include decreased value and degradation of habitat adjacent to disturbed areas and roadways; increased potential for wildlife harassment and poaching; increased potential for vehicle collisions; potential for additional stress from noise and human activity during the reproductive period resulting lowered fecundity or nest abandonment; increased intra- and inter-specific competition for resources; and exposure to contaminants located in reserve pits. The installation of above ground power lines would increase	Under Alternative D potential impacts include the initial disturbance of approximately 9,940 acres of suitable wildlife habitat. Habitat loss and fragmentation would result from the disturbance of approximately 9,175 acres of year-long crucial and 0 acres of year-long substantial pronghorn habitats; 557 acres of substantial winter, 93 acres of substantial year-long and 78 acres of crucial year-long mule deer habitats; and 918 acres of substantial winter and 792 acres of crucial year-long elk habitats. Indirect impacts would include decreased value and degradation of habitat adjacent to disturbed areas and roadways; increased potential for wildlife harassment and poaching; increased potential for vehicle collisions; potential for additional stress from noise and human activity during the reproductive period resulting lowered fecundity or nest abandonment; increased intra- and inter-specific competition for resources; and exposure to contaminants located in reserve pits. Indirect impacts under Alternative D would be lower in magnitude than those described under Alternative D

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	Wetland and aquatic habitats could be impacted by increased soil erosion, sediment yield, degradation of surface water quality, and potential for spills and leaks.	degree of disturbance and human activity. Wetland and aquatic habitats could be impacted by increased soil erosion, sediment yield, degradation of surface water quality, and potential for spills and leaks.	the potential for bird and raptor electrocution. Wetland and aquatic habitats could be impacted by increased soil erosion, sediment yield, degradation of surface water quality, and potential for spills and leaks.	as this alternative has the lowest surface disturbance. Wetland and aquatic habitats could be impacted by increased soil erosion, sediment yield, degradation of surface water quality, and potential for spills and leaks.
Special Status Plant Species	The Proposed Action would result in the initial disturbance of approximately 7,762 acres of USFWS-designated *Sclerocactus* habitat, of which 946 acres would occur in Level 1 Core Conservation Areas and 1,853 acres would occur in Level 2 Core Conservation Areas. Under the Proposed Action approximately 35 acres of wetland vegetation that maybe utilized by the Ute ladies' -tresses would be disturbed. The Proposed Action would also result in the loss of habitat for other state listed special status species within the MBPA. Indirect impacts to special status plant species include the increased potential for noxious weed invasion; increased risk of wildfire; increased fugitive dust, which may inhibit photosynthesis; increased risk of herbicide exposure; fragmentation of habitat and seed dispersion channels; and increased risk of illegal collection. The Proposed Action ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus, Pariette	The No Action Alternative would result in the initial disturbance of approximately 172 acres of USFWS-designated *Sclerocactus* habitat, of which 6 acres would occur in Level 1 Core Conservation Areas and 69 acres would occur in Level 2 Core Conservation Areas. The No Action Alternative would also result in the loss of habitat for other state listed special status species within the MBPA. Indirect impacts to special status plant species include the increased potential for noxious weed invasion; increased risk of wildfire; increased fugitive dust, which may inhibit photosynthesis; increased risk of herbicide exposure; fragmentation of habitat and seed dispersion channels; and increased risk of illegal collection. The No Action Alternative ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus, Pariette cactus, and their habitats. The No Action Alternative ***may affect, is not likely to adversely***	Alternative C would result in the initial disturbance of approximately 9,168 acres of USFWS-designated *Sclerocactus* habitat, of which 1,121 acres would occur in Level 1 Core Conservation Areas and 2,166 acres would occur in Level 2 Core Conservation Areas. Approximately 35 acres of wetland vegetation that maybe utilized by the Ute ladies -tresses would be disturbed. Alternative C would also result in the loss of habitat for other state listed special status species within the MBPA. Indirect impacts to special status plant species include the increased potential for noxious weed invasion; increased risk of wildfire; increased fugitive dust, which may inhibit photosynthesis; increased risk of herbicide exposure; fragmentation of habitat and seed dispersion channels; and increased risk of illegal collection. Indirect impacts would be similar in scope and magnitude to those under the Proposed Action. Alternative C ***may affect, is likely***	Under Alternative D, no new surface disturbance or well pad expansions would occur within Level 1 Core Conservation Areas except as allowed under the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (see Biological Assessment – Attachment to Appendix J, Biological Opinion). Indirect impacts to special status plant species include the increased potential for noxious weed invasion; increased risk of wildfire; increased fugitive dust, which may inhibit photosynthesis; increased risk of herbicide exposure; fragmentation of habitat and seed dispersion channels; and increased risk of illegal collection. Alternative D ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus, Pariette cactus, and their habitats. Alternative D ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	cactus, and their habitats. The Proposed Action ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.	***affect*** the Ute ladies'-tresses.	***to adversely affect*** the Uinta Basin hookless cactus, Pariette cactus, and their habitats. Alternative C ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.	
Special Status Animal Species	The Proposed Action would result in the loss of approximately 19 acres of western yellow-billed cuckoo nesting and foraging habitat. The withdrawal of approximately 3,966 acre-feet of water annually for construction and operation would directly impact habitat for the Colorado River fish via depletion. Increased erosion in the MBPA would increase sediment yields into the Green River by 62 tons annually. Approximately 71 acres of mountain plover concentration areas would be disturbed. The Proposed Action would also result in the loss of habitat that could be utilized for nesting and foraging by other state listed special status species within the MBPA. Disturbance in nesting habitats during the nesting season could result in the direct loss of eggs, nests, and young. Potential indirect impacts to special status animal species could include displacement from adjacent habitats and nesting areas due to increased noise, light, traffic, dust, and human	The No Action Alternative would result in the loss of approximately 1 acre of western yellow-billed cuckoo nesting and foraging habitat. The withdrawal of approximately 884 acre-feet of water annually for construction and operation would directly impact habitat for the Colorado River fish via depletion. Increased erosion in the MBPA would increase sediment yields into the Green River by 49 tons annually. The No Action Alternative would also result in the loss of habitat that could be utilized for nesting and foraging by other state listed special status species within the MBPA. Disturbance in nesting habitats during the nesting season could result in the direct loss of eggs, nests, and young. Potential indirect impacts to special status animal species could include displacement from adjacent habitats and nesting areas due to increased noise, light, traffic, dust, and human presence; habitat fragmentation; loss of suitable habitat from noxious weed invasion; decreased water quality; increased erosion and	Alternative C would result in the loss of approximately 20 acres of western yellow-billed cuckoo nesting and foraging habitat. The withdrawal of approximately 3,966 acre-feet of water annually during production would directly impact habitat for the Colorado River fish via depletion. Approximately 87 acres of mountain plover concentration areas would be disturbed. Alternative C would also result in the loss of habitat that could be utilized for nesting and foraging by other state listed special status species within the MBPA. Disturbance in nesting habitats during the nesting season could result in the direct loss of eggs, nests, and young. Potential indirect impacts to special status animal species could include displacement from adjacent habitats and nesting areas due to increased noise, light, traffic, dust, and human presence; habitat fragmentation; loss of suitable habitat from noxious weed invasion; decreased water quality; increased erosion and sedimentation; depleted flow within	Alternative D would result in the loss of approximately 1 acre of western yellow-billed cuckoo nesting and foraging habitat. The withdrawal of approximately 2,774 ac-feet annually during production would directly impact habitat for the Colorado River fish via depletion. Alternative D requires the largest water withdrawal as it has the most underground injection wells. Approximately 21 acres of mountain plover concentration areas would be disturbed. Alternative D would also result in the loss of habitat that could be utilized for nesting and foraging by other state listed special status species within the MBPA. Impacts to wetland and riparian habitat would be lowest as no disturbance would be allowed din the Pariette ACEC. Disturbance in nesting habitats during the nesting season could result in the direct loss of eggs, nests, and young. Potential indirect impacts to special status animal species include displacement from adjacent habitats and nesting areas due to increased noise, light, traffic, dust, and human presence; habitat fragmentation; loss

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	presence; habitat fragmentation; loss of suitable habitat from noxious weed invasion; decreased water quality; increased erosion and sedimentation; depleted flow within the Colorado River Basin; increased potential for accidental spills exposure to hazardous chemicals that may be present in reserve pits; increased potential for vehicle collision; alteration of surface water drainages; decreased physical health of individual animals due to anthropogenic stresses; increased potential for poaching; and loss of prey habitat. The Proposed Action is ***likely to result in a trend towards federal listing*** of the western yellow-billed cuckoo. The Proposed Action ***may affect, is likely to adversely affect*** the Colorado River fish species and their designated critical habitat..	sedimentation; depleted flow within the Colorado River Basin; increased potential for accidental spills exposure to hazardous chemicals that may be present in reserve pits; increased potential for vehicle collision; alteration of surface water drainages; decreased physical health of individual animals due to anthropogenic stresses; increased potential for poaching; loss of prey habitat. Indirect impacts would be lowest under the No Action Alternative as the least amount of development is proposed. The No Action Alternative is ***likely to result in a trend towards federal listing*** of the western yellow-billed cuckoo. The No Action Alternative ***may affect, is likely to adversely affect*** the Colorado River fish species and their designated critical habitat..	the Colorado River Basin; increased potential for accidental spills exposure to hazardous chemicals that may be present in reserve pits; increased potential for vehicle collision; alteration of surface water drainages; decreased physical health of individual animals due to anthropogenic stresses; increased potential for poaching; loss of prey habitat. Indirect impacts would be similar in scope and magnitude to those under the Proposed Action. New power lines would create an increased risk for electrocution of avian species. Alternative C is ***likely to result in a trend towards federal listing*** of the western yellow-billed cuckoo. Alternative C ***may affect, is likely to adversely affect*** the Colorado River fish species and their designated critical habitat..	of suitable habitat from noxious weed invasion; decreased water quality; increased erosion and sedimentation; depleted flow within the Colorado River Basin; increased potential for accidental spills exposure to hazardous chemicals that may be present in reserve pits; increased potential for vehicle collision; alteration of surface water drainages; decreased physical health of individual animals due to anthropogenic stresses; increased potential for poaching; loss of prey habitat. Indirect impacts would be the least intense of all the action alternatives. Alternative D is ***likely to result in a trend towards federal listing*** of the western yellow-billed cuckoo. Alternative D ***may affect, is likely to adversely affect*** the Colorado River fish species and their designated critical habitat.
Land Use and Transportation	Implementation of the Proposed Action would result in the initial disturbance of approximately 16,129 acres, which would be reduced to approximately 7,808 acres following interim reclamation. Infill development under the Proposed Action would increase the levels of construction, drilling, completion, and production activities already occurring in the MBPA and would contribute to the general semi-industrial setting.	Implementation of the No Action Alternative would result in the initial disturbance of approximately 870 acres, which would be reduced to approximately 659 acres following interim reclamation. Land use impacts would be similar to those under the Proposed Action, but would be substantially less due to fewer wells being drilled. Transportation impacts would be similar to those under the Proposed	Implementation of Alternative C would result in the initial disturbance of approximately 20,112 acres, which would be reduced to approximately 10,173 acres following interim reclamation. Land use impacts would be similar to those under the Proposed Action. Transportation impacts would be similar to those under the Proposed Action.	Implementation of Alternative D would result in the initial disturbance of approximately 10,122 acres, which would be reduced to approximately 4,978 acres following interim reclamation. Land use impacts would be similar to those under the Proposed Action, but would be less due to fewer wells being drilled. Transportation impacts would be similar to those under the Proposed Action, but would be less due to

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. An estimated 243 miles of new roads would be necessary under the Proposed Action. The projected maximum daily increase in trips per day for the Proposed Action would be 25 heavy truck trips and 10 light truck trips per well during well drilling and completion, and approximately 1,725 trips per day during well production, routine well maintenance, and periodic well stimulation and removal of produced water. Increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads.	Action, but would be substantially less due to fewer wells being drilled.		fewer wells being drilled.
Cultural Resources	Implementation of any of the alternatives could result in adverse effects to cultural resources. An adverse effect is found when an undertaking may alter (directly or indirectly) any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5[a][1]). Adverse effects include:	Under the No Action Alternative, developments could directly affect at least 870 acres in the MBPA Given the average site density of six sites per square mile, approximately 8 potential sites could be located in proposed new disturbance areas. Surface-disturbing activities including construction of well pads, access roads, pipelines, and central facilities could directly affect cultural resources. Above-ground facilities, secondary surface activities, and operation and maintenance activities could indirectly affect cultural	Under Alternative C, direct and indirect effects due to surface disturbance would be similar to those described under the Proposed Action. However, developments under Alternative C would directly affect approximately 20,112 acres. Given the average site density of six sites per square mile, approximately 188 potential sites could be located in proposed new disturbance areas under Alternative C. However, the above-mentioned	Under Alternative D, development of well pads, access roads, pipelines, and central facilities would result in approximately 10,122 acres of surface disturbance. Given the average site density of six sites per square mile, approximately 96 potential sites could be located in proposed new disturbance areas. Under Alternative D, direct and indirect effects due to surface disturbance would be similar to those described under the Proposed Action. However, under Alternative D, the

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	• Physical destruction of or damage to all or part of the property; • Alteration or removal of a property from its historic location; • Change in the character of the property's use or the physical features within the property's setting; • Introduction of visible, audible, or atmospheric elements out of character with the significant historic features of the property; • Neglect leading to deterioration or vandalism; and • Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (36 CFR 800.5[a][2). However, the above-mentioned effects are unlikely to be adverse because of implementation of the ACEPMs identified in Section 2.2.12.8 of the EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in Section 2.2.12.1 would also be implemented to reduce indirect effects to cultural resources.	resources and contribute to an alteration of the overall setting and feeling of the MBPA. The direct and indirect effects of the No Action Alternative would be similar to those outlined under the Proposed Action but their extent would be reduced.	effects are unlikely to be adverse because of implementation of the ACEPMs identified in Section 2.2.12.8 of the EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in Section 2.2.12.1 would also be implemented to reduce indirect effects to cultural resources.	extent of direct and indirect effects would be reduced and are unlikely to be adverse. However, adverse effects are unlikely because of implementation of the ACEPMs identified in Section 2.2.12.8 of the EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in Section 2.2.12.1 would also be implemented to reduce indirect effects to cultural resources.
Recreation	The Proposed Action could result in short-term impacts to recreation due to project-related construction, operation and maintenance activities, which would include	Under the No Action Alternative, both short-term and long-term impacts would be similar to those described for the Proposed Action, but would be substantially less due to	Under Alternative C, short-term impacts would be similar to those described for the Proposed Action. Long-term impacts would be similar to those described for the	Under Alternative D short-term and long-term impacts would be similar to those described for the Proposed Action, but would be less due to reduced well development. There

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	increased noise, dust, traffic, visual intrusions, and increased industrial presence. Long-term adverse effects would include a decrease in some recreational opportunities due to the direct conversion of 7,808 acres of land to well field facilities, adverse visual impacts for river recreationists, and disturbance of wetland areas. Potential long-term beneficial effects on recreation under the Proposed Action would include increased access to recreational opportunities due to 243 miles of new roads. Motorized and mechanized users would receive the greatest benefits from the increased access.	less well development. There would be a decrease in recreational opportunities due to the direct conversion of 659 acres of land to well-drilling facilities, but increased access to recreational opportunities due to 23 miles of new roads.	Proposed Action; however, field-wide electrification would result in additional visual impacts and intrusions that could further diminish the recreational experience for visitors to the MBPA, particularly those visiting the Pariette Wetlands ACEC. There would be a decrease in recreational opportunities due to the direct conversion of land to well-drilling facilities, but increased access to recreational opportunities due to 243 miles of new roads.	would be a decrease in recreational opportunities due to the direct conversion of land to well-drilling facilities, but increased access to recreational opportunities due to 544 miles of new roads.
Visual Resources	Under the Proposed Action, approximately 2,452 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 11,270 acres of initial disturbance would occur in VRM Class IV designated areas. Proposed development within the designated VRM Class III and Class IV areas would be consistent with management objectives for these visual classes. Only one acre of VRM Class II land would be disturbed, due to existing roads that would require improvement or upgrade. Short-term effects on visual resources would be related to surface disturbance reclamation, and would diminish as vegetation	Under the No Action Alternative, approximately 7 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 69 acres of initial disturbance would occur in VRM Class IV designated areas. No VRM Class II land would be disturbed. Both short-term and long-term impacts would be similar to those described for the Proposed Action, but would be substantially less due to less well development.	Under Alternative C, approximately 3,007 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 13,618 acres of initial disturbance would occur in VRM Class IV designated areas. Only one acre of VRM Class II land would be disturbed, due to existing roads that would require improvement or upgrade. Both short-term and long-term impacts would be similar to those described for the Proposed Action. However, with the installation of power lines and substations to support well operations, this alternative would likely have greater visual impacts than the Proposed Action.	Under Alternative D, approximately 1,384 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 7,213acres of initial disturbance would occur in VRM Class IV designated areas. Approximately 46 acres of VRM Class II land would be disturbed. Both short-term and long-term impacts would be similar to those described for the Proposed Action. More VRM Class II lands would be disturbed under this alternative than under any other alternative; however, some of the initially disturbed area would be reclaimed after completion of well development, so the long-term disturbance would be less.

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	becomes reestablished. However, the potential establishment of invasive species in surface-disturbed areas would increase the risks of wildland fire, and potentially alter short- and long-term scenic quality because of the visual contrasts created by fire. Long-term impacts could occur within relatively slow-growing shrub or woodland areas, where regrowth could take more than 5 years. Short-term impacts also would include drilling rig visibility at drilling locations. Long-term impacts would include pipeline, infrastructure and well pad visibility, as well as surface disturbances from well pad and access road construction. Other direct impacts associated with the Proposed Action would include artificial light and related light pollution (e.g., sky glow) from night lighting required for night-time drilling. Indirect visual effects would include vehicle-related fugitive dust, which could adversely impact long-distance scenic quality.			
Special Designations	The relevant and important (R&I) values for which the Pariette Wetlands ACEC is designated include special-status bird and plant species habitat and wetland ecological systems and processes.	Under the No Action Alternative, no development would occur in the Pariette Wetlands ACEC. Therefore, the No Action Alternative would have no impact on special-status species habitat or wetland ecological	Under Alternative C, approximately 1,244 acres would be initially disturbed in the Pariette Wetlands ACEC. Impacts of Alternative C on wetland ecological processes and special-status species habitat	Under Alternative D, approximately 447 acres could be initially disturbed in the Pariette Wetlands ACEC. Impacts of Alternative D on wetland ecological processes and special-status species habitat would be

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	Under the Proposed Action, up to approximately 1,209 acres would be initially disturbed in the Pariette Wetlands ACEC. The R&I values for which the Lower Green River Corridor ACEC include riparian habitat and high-quality scenic values. Under the Proposed Action, approximately 0.02 acres would be disturbed within the Lower Green River Corridor ACEC, due to an existing ROW that would require improvement or upgrade. Impacts to riparian habitat in this ACEC are not anticipated. Well infrastructure would be visible from certain portions of the Lower Green River Corridor ACEC, thereby having an effect on scenic values Approximately 1.5 acres would be initially disturbed within the proposed Lower Green River WSR. Indirect impacts to the ORVs for which the Lower Green River was found eligible for designation could include possible auditory disturbance to recreational users on the river; potential visual intrusions in the middleground distance; and potential increases in sedimentation and depletion of the river.	processes within the ACEC. No development would occur within the Lower Green River Corridor ACEC. Therefore, there would be no substantial impact to the relevant and important values for which the ACEC was designated. No development would occur within the proposed Lower Green River WSR. Therefore, there would be no direct impacts to the ORVs in the immediate environment. Indirect impacts to the ORVs for which the Green River was found eligible for designation would be minimal, because no development would occur in the proposed WSR area.	would be similar to those described under the Proposed Action. Approximately 1.6 acres would be disturbed within the Lower Green River Corridor ACEC. Impacts on riparian habitat and high-quality scenic values would be similar to those described under the Proposed Action. Approximately 1.5 acres would be initially disturbed within the proposed Lower Green River WSR. Therefore, there would be no substantial direct impacts to the ORVs in the immediate environment, similar to conditions under the Proposed Action. Indirect impacts to the ORVs for which the Green River was found eligible for designation would be similar to those described under the Proposed Action	similar to those described under the Proposed Action, but would be less extensive due to the minimized surface disturbance within the ACEC. No development would occur within the Lower Green River Corridor ACEC. Impacts on riparian habitat and high-quality scenic values within this ACEC would be similar to those described under the No Action Alternative. Development of approximately 24 acres would occur within the proposed Lower Green River WSR. Indirect impacts to the ORVs for which the Lower Green River was found eligible for designation could include possible auditory disturbance to recreational users on the river; potential visual intrusions in the middleground distance; and potential increases in sedimentation and depletion of the river.
Socio-Economics	Because Duchesne and Uintah Counties have resource-based	Implementation of the No Action Alternative would employ	The employment and personal income figures assume that costs	Implementation of Alternative D would employ approximately 478

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	economies, the Proposed Action would contribute to the population growth that is driven by the recent increase in oil and gas development. The Proposed Action would employ approximately 478 people on average per day throughout the construction phase, and 46 people on average per day throughout the operation and maintenance phase. In addition, jobs in the mining, construction, and services industries would increase to serve the people employed in well construction and operations. Based on a total of 5,750 wells proposed under the Proposed Action, net local revenue annually would total a maximum of approximately $212 million. Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. The anticipated increase in population would increase the need for social services and infrastructure. Increased revenues from well construction and production would provide affected jurisdictions with additional funding for their services; however, it is not known if the additional funds would adequately cover the costs for providing additional	approximately 468 workers on average per day during the construction phase, and 24 workers on average per day during the operation and maintenance phase. Based on a total of 778 wells proposed under this alternative, net local revenue annually would total a maximum of approximately $29.1 million. Impacts would be similar to those described for the Proposed Action, but would be substantially less due to less well development.	associated with constructing an infrastructure for electrification would make the alternative feasible. According to the project applicant, implementation of Alternative C would require the installation of eleven generating stations comprised of two 20MW gas turbine generators and one 10MW steam turbine, which combined would generate 550MW of electricity. The project applicant has estimated the lifetime cost of self-generation at $600 million each for 11 generation stations, including distribution systems but excluding on-drill pad electrification costs and fuel value. About 57% of the generated supply would be for Green River development, with the balance for Deep Gas wells. All costs (facility, distribution and wells), reduced to a per-Green River-well basis, exceeds $1.4 million. This amount exceeds all current well specific development costs and would make Green River wells uneconomical to develop. Deep Gas cost, on a per well basis, would be $1.14 million. If Alternative C is economically infeasible, then no wells would be developed, and no jobs or personal income gains would be realized. In addition, if Alternative C were determined to be economically infeasible, both Newfield and the non-operating working interest owners would not realize any	workers on average per day during the construction phase, and 46 workers on average per day during the operation and maintenance phase. Based on a total of 5,750 wells proposed under this alternative, net local revenue annually would total a maximum of approximately $212 million. Other impacts would be similar to those described under the Proposed Action.

Resource	Alternative A – Proposed Action Impacts	Alternative B – No Action Alternative Impacts	Alternative C – Field-wide Electrification	Alternative D – Resource Protection Alternative
	services. Immigrants who would work under the Proposed Action would find housing that is available and affordable.		income from the MBPA.	
Environmental Justice	No disproportionately high or adverse human health or environmental impacts on low-income, minority, or Tribal populations would occur as a result of the Proposed Action. An increase in direct and indirect employment opportunities for members of the EJ communities could be provided as a result of the Proposed Action.	Impacts would be similar to the Proposed Action, but would be substantially less due to less well development, including the potential employment impacts.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action, but would be less due to less well development, including the potential employment impacts.

CUMULATIVE IMPACTS

Chapter 5 of the Final EIS analyzes the cumulative impacts to specific resource values and uses that could occur from implementation of the Proposed Action and the other alternatives, in conjunction with other impacts from past, ongoing, and reasonably foreseeable future actions. In addition to the evaluation of direct impacts, NEPA regulations require an assessment of cumulative impacts (40 C.F.R § 1508.7, 1508.25). CEQ regulations implementing NEPA define a cumulative impact as:

> "... The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The following sections identify the time frame for effects; the past, present, and reasonably foreseeable future projects to be analyzed; and the cumulative impacts for each resource. The primary human influences in the area have been oil and gas development, historic and current gilsonite mining, and livestock grazing. The compilation of these actions provides the basis for estimating future environmental changes that may affect the extent and quality of the natural and human environment.

The geographic scope of each specific Cumulative Impact Analysis Area (CIAA) varies by resource and is larger for resources that are mobile or migrate as compared to those that are stationary. The CIAA for many of the resources discussed in this section includes the watersheds that intersect the MBPA. For some resources, the CIAA is smaller due to the geographically confined nature of cumulative impacts (e.g., areas of special designation), while for others (e.g., socioeconomics) the CIAA is much larger and includes both Duchesne and Uintah Counties. **Table ES-3** identifies the CIAAs for individual resources and resource issues as well as the rationale for the selection of each area.

In general, the timeframe of the analysis is the 41 to 51-year anticipated life of project (LOP) anticipated under the Proposed Action and Alternative C. However, the timeframe of cumulative impacts may vary from one resource value or use to another, depending on variations in the duration of different actions.

Although much of the analysis focuses on adverse cumulative impacts, it should be noted that cumulative impacts may also be beneficial. For example, there are significant positive cumulative economic effects of oil and gas development, including additional employment opportunities in the region, additional tax revenues to local governments, and increased royalties to the federal government.

TABLE ES-3
CUMULATIVE IMPACT ANALYSIS AREAS

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Air Quality	Uinta Basin, nearby Class I areas	Construction, development, and production activities from implementation of the alternatives would cumulatively contribute to changes in air quality occurring immediately adjacent to the MBPA and within the greater Uinta Basin.

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Geology and Minerals – Topography, Physiography, Oil and Gas Resources, and Other Leasable, Locatable, and Saleable Minerals	MBPA	Oil and gas operations would have an impact on subsurface resource uses located within the MBPA and underlying the MPBA either by contaminating other possible mineral resources or preventing access to those sources.
Geology and Minerals – Tar Sands	Special Tar Sand Areas Entirely or Partially within the MBPA	Oil and gas operations would have an impact on the commercial extraction of tar sands within STSAs by impeding the development of tar sand extraction facilities and operations.
Geology and Minerals – Oil Shale	Known Oil Shale Lease Areas Entirely or Partially within the MBPA	Oil and gas operations would have an impact on oil shale extraction activities within KOSLAs by impeding the development of oil shale extraction facilities and operations.
Paleontological Resources	MBPA plus Geographic Extents of Related Paleontological Resources	Construction activities resulting in destruction or damage to paleontological resources could impact BLM's future ability to understand a region's history.
Soil Resources	All Watersheds within the MBPA	Project activities impacting soils would only affect soil types present in the Greater Monument Butte watersheds and would not cause additive affects to those occurring elsewhere.
Water Resources[1]	All Watersheds within the MBPA	Because all project activities would occur in the Greater Monument Butte watersheds, impacts associated with these activities would only affect these watersheds and would not cause additive affects to those occurring elsewhere.
Vegetation[2]	All Watersheds within the MBPA	Project activities impacting vegetation would only affect species present in the watersheds of the MBPA and would not cause additive affects to those occurring elsewhere.
Range Resources	All Grazing Allotments within the MBPA	Because all project activities on BLM-administered lands would occur on these allotments, impacts associated with these activities would only affect these areas and would not cause additive effects to those occurring elsewhere.
Fish and Wildlife	Terrestrial Wildlife: Species-specific habitats within the Watersheds of the MBPA Fish: All Watersheds within the MBPA	Only activities occurring within potential habitat or near individual special status plant, fish, and wildlife species would contribute to impacts.

Resource	Cumulative Impacts Analysis Area	Study Area Rationale
Special Status Plant, Fish, and Wildlife Species	Extent of Potential Habitat for the Uinta Basin hookless cactus and Pariette cactus; all Watersheds within the MBPA for all other special status plant, fish, and wildlife species	Only activities occurring within potential habitat or near individual special status plant, fish, and wildlife species would contribute to impacts.
Cultural Resources	MBPA	Construction activities resulting in destruction or damage to cultural resources could impact BLM's future ability to understand a region's history.
Land Use and Transportation	MBPA	Impacts to land use and transportation would be limited to the MBPA because all construction and land disturbance occurs within the MBPA and would have no additive impacts on the surrounding lands and roads.
Recreation Resources	MBPA and a 2-mile Buffer Surrounding the MBPA	Impacts to recreation resources would be limited to a 2-mile buffer surrounding and including the MBPA from which public users may hear industrial noise, increased traffic, etc. from oil and gas operations. Impacts associated with these activities would only affect these areas and would not cause additive effects to those occurring elsewhere.
Visual Resources	Lower Green River ACEC and the Wild and Scenic Green River Corridor Plus Areas Surrounding the MBPA from which Project Impacts can be Viewed	Project activities impacting visual resources could cause additive visual impacts to those within the MBPA and to areas outside the MBPA but within the viewshed of project related impacts.
Special Designations	Special Designation Areas within the MBPA and within the Viewshed of the MBPA	Direct effect would come from those ground disturbing activities that occur directly within these special designation areas and from areas within the viewshed of the MBPA.
Socioeconomics	Uintah and Duchesne Counties	This spatial boundary was selected because oil and gas development within the Uinta Basin has had substantial impact on taxes and royalties collected by the State of Utah, a portion of which has been reallocated to Duchesne and Uintah Counties. Because minority, low-income, and Tribal populations currently reside in these counties, they would all be considered when evaluating environmental justice concerns for oil and gas projects.

[1] Includes floodplains.

[2] Includes noxious and invasive weeds, and wetland/riparian zones.

CONSULTATION AND COORDINATION

The following list contains agencies, organizations, and individuals that were contacted and consulted, and/or responded to the public scoping process and/or preparation of this Final EIS:

Federal Offices

- Ashley National Forest
- United States Environmental Protection Agency (EPA), Region 8
- United States Fish and Wildlife Service (USFWS)

Tribes

- Northern Ute Indian Tribe

State Offices

- Utah Division of Air Quality (UDAQ)
- Utah Division of Wildlife Resources (UDWR)
- Utah Governor's Office
- Utah Governor's Public Lands Policy Coordination Office (PLPCO)
- Utah School and Institutional Trust Lands Administration (SITLA)
- Utah State Office
- Utah State Office of Energy Development
- Utah State Historical Preservation Office (SHPO)

Local Offices

- Duchesne County
- Duchesne County Commissioner's Office
- Uintah County
- Uintah County Commissioner's Office
- Uintah County Public Lands

Private Sector Organizations

- Beatty & Wozniak, P.C.
- Kleinfelder, Inc.
- El Paso Corporation
- Ziegler Chemical and Mineral Corp.

Individuals

- Dale M. Rasmussen

Cooperating Agencies

The EPA, PLPCO, Duchesne County, and Uintah County agreed to participate as CAs and have signed related memorandums of understanding (MOUs). The U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (USACE) have been on-going cooperators under the BLM Energy Pilot Office program authorized by the Energy Policy Act of 2005. The remaining agencies have yet to participate as formal CAs, but would likely participate as informal cooperators in a review capacity.

In addition, there was extensive coordination with the BLM Utah Air Resource Technical Advisory Group (RTAG). As required by the *NEPA Air Quality MOU for Federal Oil and Gas Decisions* (signed June 23, 2011), the RTAG met January 16, 2013 to discuss the air quality analysis for this EIS. Input was sought and received from EPA, National Park Service, US Forest Service, US Fish and Wildlife Service, and Utah Department of Environmental Quality, all of whom participated in the RTAG meeting.

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1.0 INTRODUCTION

1.1 BACKGROUND

Newfield Exploration Company (Newfield) has notified the United States (U.S.) Bureau of Land Management's (BLM) Vernal Field Office (VFO) of its need to expand their ongoing oil and natural gas development within and in the vicinity of the Greater Monument Butte Unit (GMBU). Newfield proposes to implement a plan to fulfill its obligations and responsibilities under federal leases to explore, develop, and produce commercial quantities of oil and natural gas. The Monument Butte Project Area (MBPA) is located in southeastern Duchesne County and southwestern Uintah County. The MBPA consists of approximately 119,743 acres located in Township 4 South, Range 1 East; Township 5 South, Range 3 West; Township 8 South, Range 15-19 East; Township 9 South, Range 15-19 East; and Township 10 South, Range 15-18 East (see **Figure 1.1-1 – Attachment 1**).

Surface ownership in the MBPA is approximately 87 percent federal (managed by the BLM), approximately 11 percent State of Utah (managed by State Institutional Trust Lands Administration [SITLA]), and approximately 2 percent private. Mineral interests are owned by the BLM (89 percent), the state of Utah (10 percent), and private interests (less than one percent). Lands with separate surface and mineral ownership, also known as "split estate lands," comprise approximately 18 percent of land within the MBPA. Mineral and surface ownership rights are summarized in **Table 1.1-1**.

TABLE 1.1-1
SURFACE AND OIL AND GAS MINERALS OWNERSHIP WITHIN THE MBPA

Surface Owner	Surface Acres	Surface Percentage	Mineral Acres	Mineral Percentage
BLM	103,891	87	106,562	89
State of Utah	12,878	11	11,983	10
Private	2,974	2	1,198	1
Totals	119,743	100	119,743	100

Federal lands in the MBPA are under the jurisdiction of the BLM VFO. The VFO has determined that implementing the proposed development constitutes a federal action requiring the preparation of an Environmental Impact Statement (EIS). The EIS serves the purpose of disclosing and analyzing impacts from the Proposed Action, the No Action alternative, and the other alternatives that have been developed.

Newfield, a private corporation, proposes development of their leases in the MBPA for the purpose of making a profit on the extraction and sale of oil and gas resources. In addition to developing the subsurface resources in the MBPA, Newfield's proposed project would increase the supply of oil and natural gas and would contribute to the economic vitality of local communities through increased employment opportunities and expanded tax bases. Newfield's proposed oil and natural gas development project would be consistent with the Energy Policy Act of 2005 (Pub. L. No. 109-58), as it would provide a domestic source of oil and natural gas to meet rising national energy demand.

Newfield's objective is to develop their leases and efficiently produce commercial and economic quantities of oil and gas in the MBPA. Newfield estimates that its plan could yield approximately 334.9 million barrels of oil (MMBO), 540,669 million cubic feet (MMCF) of natural gas, and 10,085 million barrels (Mbbl) of natural gas liquids (NGLs) from the Green River formation, and 6.9 trillion cubic feet (Tcf) of natural gas from the deep gas development through 2035.

1.2 PURPOSE AND NEED

The purpose of this EIS is to facilitate the BLM decision-making process as to whether to approve, approve with modifications, or disapprove Newfield's proposed project and project components based on an evaluation of the expected impacts. Through this process, the BLM's purpose is to minimize or avoid environmental impacts to the extent possible, while allowing Newfield to exercise its valid lease rights. The need for a BLM action is to respond to this proposal. The Federal Land Policy and Management Act of 1976, or FLPMA (Public Law 94-579, 43 United States Code [U.S.C.] 1701 et seq.), recognizes oil and gas development as one of the "principal" uses of the public lands. Federal mineral leasing statutes, including the Mineral Leasing Act of 1920, 30 U.S.C. 181 et seq., and the implementing regulations by which they are enforced recognize the statutory right of lease holders to develop federal mineral resources to meet continuing national needs and economic demands, subject to lease stipulations and reasonable measures that BLM may require to minimize adverse impacts.

1.3 EIS DECISION FRAMEWORK

This EIS is prepared in accordance with the National Environmental Policy Act (NEPA) and in compliance with the Council of Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), U.S. Department of Interior NEPA implementation regulations (40 CFR Part 36), with guidelines listed in the BLM NEPA Handbook (H-1790-1, BLM 2008a), and with additional directions provided in the BLM Utah NEPA Guidebook (BLM 2010). The BLM is the lead federal agency tasked with the preparation of the EIS.

1.4 DECISIONS TO BE MADE AND IMPLEMENTATION PROCESS

This EIS evaluates four alternatives. It should be noted that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities under each alternative are conceptual at this point. These locations have been illustrated on the alternative-specific maps in this EIS (**Figures 2-1** through **2-4 – Attachment 1**) for analytical and impact evaluation purposes only. Actual locations for well pads, access roads, ROWs, and other surface facilities would be determined at the Project implementation phase.

The Record of Decision (ROD) associated with this EIS would approve an overall development plan for federal surface and minerals within the MBPA. The ROD could approve one of the alternatives or a combination of the alternatives. However, the ROD would not be the final approval for all actions associated with the EIS. Individual components of the selected alternative involving surface disturbance to federal lands or development of federal minerals must be analyzed and approved on a site-specific basis by the BLM. The method used to evaluate each component of the selected alternative is the Application for Permit to Drill (APD), right-of-way (ROW) or Sundry Notice approval process. These grant processes are discussed below.

An operator can initiate the APD process by filing either an APD or a Notice of Staking (NOS). The NOS consists of an overview of the operator's site-specific proposal, including a location map and a sketched site plan. The APD includes the site-specific Surface Use Plan of Operations (SUPO) and Drilling Plan. The detailed information required to be submitted for each APD is identified in *Onshore Oil and Gas Order No. 1* and 43 CFR 3162.3.

It is important to note that very few facilities in the MBPA would require authorization under a ROW, since much of the proposed development would occur within the Greater Monument Butte Unit boundary. As

most facilities would be within the Unit they are authorized as either Unit facilities or as well facilities under an APD. Nonetheless, the ROW process is described below.

Operators are required to submit a ROW application to obtain approval to construct a pipeline, well pad, road, or ancillary facility located off-lease or off-unit on BLM-administered lands. A ROW[1] would also be necessary within the Unit if the action is proposed by a party other than the Unit operator. APDs are often acceptable as applications for ROW grants for off-lease facilities if they provide sufficient detail about the entire proposal. The detailed information required to be submitted for each ROW application is identified in 43 CFR 2800.

Operators are required to submit a Sundry Notice to obtain approval to construct additional on-Unit facilities (e.g. additional pipelines or ancillary facilities). Most of the proposed oil and gas expansion project would lie within Newfield's Unit and lease boundaries. However, site-specific project development may require that Newfield secure ROWs to facilitate access to the Unit by roads, power lines, or pipelines.

Prior to approving an APD, ROW, or Sundry Notice, the BLM must consider the environmental impacts of the proposed activity, in compliance with NEPA. The environmental review includes an onsite inspection of the proposed well location, access road, pipeline locations, and associated facilities to identify site-specific environmental impacts and mitigation measures. After the onsite inspection is performed, the operator would submit the APD or would revise the APD, if necessary. Through the site-specific NEPA process, additional mitigation measures (e.g., adjusting the proposed locations of well pads, access roads, and pipelines to avoid a sensitive resource; identifying specific construction methods to be employed; or identifying reclamation standards) may be added as Conditions of Approval (COAs) to APDs to protect affected resources.

There are approximately 75 working interest owners, ranging from individuals to mid-size independent oil and gas companies. The GMBU is intended to facilitate the orderly and timely development of oil and gas resources within its area. The goal of unitization is to increase recovery through cooperative unit development, and unitization also helps to prevent waste and protect correlative rights. The decisions in the EIS, and ultimately the ROD, will impact not only Newfield, but also the non-operating working interest owners.

1.5 CONFORMANCE WITH BLM MANAGEMENT PLANS AND OTHER LAWS AND POLICY CONSIDERATIONS

Management objectives for lands under the authority of the VFO are contained within the Vernal ROD and approved Resource Management Plan (RMP) (BLM 2008b). The RMP allows for the exploration and development of oil and gas resources while protecting or mitigating impacts to other resource values.

The goals and objectives of the Minerals and Energy Resources management decisions of the Approved RMP are as follows:

- Meet local and national non-renewable and renewable energy and other public mineral needs.
- Support a viable long-term mineral industry related to energy development while providing reasonable and necessary protections to other resource.
- The following principles will be applied:

[1] The term ROW is frequently used throughout this document when discussing a road or pipeline corridor, but it does not necessarily mean that a BLM ROW would be needed.

- Encourage and facilitate the development by private industry of public land mineral resources in a manner that satisfies national and local needs and provides for economical and environmentally sound exploration, extraction and reclamation practices.
- Process applications, permits, operating plans, mineral exchanges, leases, and other use authorizations for public lands in accordance with policy and guidance.
- Monitor salable and leasable mineral operations to ensure proper resource recovery and evaluation, production verification, diligence, and inspection and enforcement of contract sales, common use areas, community pits, free use permits, leases and prospecting permits.

- This plan will recognize and be consistent with the National Energy Policy by:
  - Recognizing the need for diversity in obtaining energy supplies
  - Conserving sensitive resource values
  - Improving energy distribution opportunities (BLM 2008b).

Most of the subject leases were issued prior to the completion of the Vernal ROD and Approved RMP, and with stipulations that were standard at that time. Development conducted under these leases that were issued prior to the approval date of the Vernal ROD and Approved RMP are not subject to conformance with the Approved RMP if conformance would conflict with valid existing rights afforded by the leases. For those leases issued after the approval date, the management decisions of the Approved RMP would apply.

In addition, some plans proposed in the Approved RMP, such as the comprehensive integrated activity plan described in the ACEC-11 decision, had not been finalized at the time the Proposed Action and related alternatives were analyzed (BLM 2008b).

The Proposed Action and related alternatives are deemed in conformance with management decisions made in the Vernal ROD and Approved RMP where applicable.

1.5.1 Consistency with Other Plans, Statutes, and Objectives

Utah Code Section 63J-8-105.5 established the Uintah Basin Energy Zone, which includes the MBPA. The highest management priority for these lands is responsible development of energy resources. SITLA has leased all of the state lands within the MBPA and permits on-going oil and gas production. These actions are consistent with SITLA's primary objective to fund the state school system. The Proposed Action and Alternatives C and D would allow for oil and gas production on federal leases and would be consistent with the objectives of the Uintah Basin Energy Zone.

The Proposed Action and Alternatives C and D would be in compliance with the *Duchesne County General Plan*, as amended (Duchesne County 2005, 2007, 2012, 2013). This General Plan supports responsible natural resource use and development and emphasizes the need to keep public lands open for oil and gas exploration and development under multiple-use and sustained yield principles.

The Proposed Action and Alternatives C and D would be in compliance with the *Uintah County General Plan 2005*, as amended (Uintah County 2005, 2012). This General Plan supports oil and gas development, emphasizes responsible multiple-use of public lands, and optimizes utilization of public resources.

The Proposed Action and Alternatives C and D would be in compliance with Federal, State, and local laws and regulations. Increased development of oil and gas resources on public lands is consistent with Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA), Comprehensive National Energy Strategy

announced by the U.S. Department of Energy in April 2008, the Energy Policy and Conservation Act (42 U.S.C. 6201), and the Energy Policy Act of 2005.

1.6 AUTHORIZING ACTIONS

Newfield must obtain federal, state, and local permits, along with ROW grants, licenses, easement agreements, and other authorizing actions to proceed with all project-related development. Federal, state, and local regulatory and permitting actions required to implement any of the alternatives would generally be the same, regardless of which alternative is selected. A summary of the key permits, approvals, and authorizing actions that may apply to the action alternatives is provided in **Table 1.6-1**. This list is not comprehensive.

TABLE 1.6-1
KEY FEDERAL, STATE, AND LOCAL PERMITS, APPROVALS, AND AUTHORIZING ACTIONS FOR CONSTRUCTION, OPERATION, MAINTENANCE, AND ABANDONMENT OF THE PROPOSED PROJECT

Issuing Agency	Name and Nature of Permit/Approval	Regulatory Authority (if appropriate)	Applicable Project Component
Federal Permits, Approvals, and Authorizing Actions			
U.S. Bureau of Land Management (BLM)	Permit to Drill, Deepen, or Plug Back (APD/Sundry Process) - controls drilling and development of oil and gas on federal onshore leases.	MLA (30 USC 181 et seq.); 43 CFR 3162; National Mining and Minerals Policy Act of 1970, the FOOGLRA of 1987, (Onshore Oil and Gas Orders #1 and #2 [43 CFR 3164])	Wells and production facilities
	ROW Grants and Temporary Use Permits - grants ROW use on BLM-managed lands.	MLA as amended (30 USC 185); 43 CFR 2880; FLPMA (43 USC 17611771); 43 CFR	Oil and gas pipelines, roads, facilities, etc. on BLM-managed lands
	Antiquities, Cultural, and Historic Resource Permits - issue antiquities and cultural resources use permits to inventory, excavate, or remove cultural or historic resources from federal lands.	Antiquities Act of 1906 (16 USC Section 431-433); Archaeological Resources Protection Act of 1979 (ARPA) (16 USC Sections 470aa47011); 43 CFR Part 3; Section 106 of the National Historic Preservation Act (NHPA)	All surface-disturbing activities
	Approval to dispose of produced water - controls disposal of produced water from federal leases, except Underground Injection Control (UIC) permitting	MLA (30 USC 181 et seq.); 43 CFR 3164; Onshore Oil and Gas Order No. 7	Wells and production facilities

Issuing Agency	Name and Nature of Permit/Approval	Regulatory Authority (if appropriate)	Applicable Project Component
	Pesticide Use Permit and Daily Pesticide Application Record - control of pests.	BLM Authorization for Herbicide Applications on Federal Lands	Wells, roads, and ancillary facilities
	Paleontological Resource Use Permit - approval for surveys and potential data collection of paleontological resources on federal lands.	FLPMA (302[b])	All surface-disturbing activities
	BLM regulations surrounding fracking operations on federal and Tribal lands.	43 CFR Part 3160 Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands	Hydraulic Fracturing Operations (applicable only when/if rule is implemented)
U.S. Army Corps of Engineers (USACE)	Section 404 permit (Nationwide and Individual) - controls discharge of dredged or fill materials into waters of the U.S.	Section 404 of the Clean Water Act of 1972 (CWA) (33 USC 1344)	All surface-disturbing activities affecting navigable waters of the U.S. and their tributaries or wetlands, such as road and pipeline crossings
U.S. Environmental Protection Agency (EPA)	EPA has responsibility for implementing environmental programs for Indian Country (as defined at 18 USC § 1151) until Tribal governments are formally authorized to implement these programs, including the Clean Air Act (CAA) and CWA permitting,	CAA, as amended, 42 USC Annotated (USCA) Section 7410-762 (PL 95-604, PL 95-95) Federal Water Pollution Control Act, as amended by the CWA, 33 USCA Section 1251-1376 (PL 92-500, PL 95-217) Safe Drinking Water Act, 452 USCA Section 300F-300J-10 (PL 93-523)	Oil and gas pipelines, roads, facilities, air quality permits, etc. in Indian Country

Issuing Agency	Name and Nature of Permit/Approval	Regulatory Authority (if appropriate)	Applicable Project Component
	Class II Underground Injection Control (UIC) permit. EPA is also responsible for responsible for permitting waterflood injection wells for enhanced oil recovery (EOR) within the exterior boundary of the U&O Reservation.	UIC (40 CFR 146.21 through 146.24), Safe Water Drinking Act, Area UIC Permit No. UT22197-0000	Underground disposal of deep waste water produced in conjunction with oil and gas production
U.S. Fish and Wildlife Service	ESA Section 7 consultation, coordination, and impact review on Federally listed threatened and endangered (T&E) species Migratory Bird Treaty Act (MBTA) and Bald Eagle Protection Act (BEPA) consultations	Endangered Species Act (ESA), MBTA, BEPA	Proposed construction, drilling, completion, and production
State Permits, Approvals, and Authorizing Actions[2]			
Governor's Public Lands Policy Coordination Office (PLPCO)	Utah Principal Investigator Permit Antiquities Annual Permit - authorizes the holder to conduct archeological surveys on state and private lands.	Utah State Antiquities Act Utah Code § 9-8-305	Archaeological resource investigations on state and private lands
	Utah Archaeological Data Recovery Permit - authorizes the principal investigator to recover data on state lands.	Utah State Antiquities Act Utah Code § 9-8-301-308	Archaeological excavation on state lands
Utah State Historical Preservation Office (SHPO)	Section 106 consultation for cultural resource clearances, inventories, evaluation, and mitigation	National Historic Preservation Act	Surface disturbing activities and other activities that have the potential to affect cultural resources
Utah Department of Transportation (UDOT)	Transport Permit - authorizes oversize, over length, and overweight load transportation on state highways.	Motor Carrier Rules Utah R909-1	Transportation of equipment and materials on state highways

[2] Many of the State permits and regulatory authorities included in this list are for activities conducted outside of Indian Country.

Issuing Agency	Name and Nature of Permit/Approval	Regulatory Authority (if appropriate)	Applicable Project Component
Utah School and Institutional Trust Lands Administration (SITLA)	Issue a mineral lease, ROW grant/permit for construction and use activities on State Trust Lands.	SITLA Rights-of-Entry Rules Utah R850-21 and R850-41	Facilities on state lands
Utah Division of Oil, Gas & Mining (UDOGM)	Regulates activities associated with drilling of oil and gas wells in state, including bonding on state and private lands, permitting wells on federal, Indian trust, state and/or private minerals. Permits Class II injection wells outside of Indian Country. Sets well spacing on state and private minerals.	Permitting of Wells, Utah R649-3-4 et seq., R649-3-18; UIC Rules Utah R649-5 and R649-3-2	Wells (production and disposal); waste and disposal facilities; flaring of gas wells
Utah Division of Water Rights	Review and issuance of stream alteration permit that are not waters of the	Utah Code 73-3-29	Perennial stream crossings
	Approval to Appropriate Water - grants permit to appropriate water.	Utah Code 73-3-2	Non-consumptive and consumptive water uses
Utah Division of Water Resources	Determination of adequate water supply and cumulative impacts on water supply. Section 401, CWA Water Quality Certification Stream and Wetland Crossings	CWA as it pertains to state government (Section 401)	All surface disturbing activities affecting waters of the U.S. or wetlands, such as road and pipeline crossings outside of Indian Country
Utah Department of Environmental Quality (UDEQ)	Utah Pollutant Discharge Elimination System (UPDES) Permit - authorizes discharge of pollutants to surface waters of the State.	Utah Code 19-5; UPDES Rules Utah R317-8	Any point-source surface discharge
	UPDES General Permit for Storm Water Discharges - controls discharge of storm water pollutants associated with industrial and construction activities	Utah Code 19-5; UPDES Rules Utah R317-8	Construction activities disturbing more than five (5) acres of land, and oil and gas production facilities that have had a discharge of reportable quantity
	UPDES Construction Dewatering Permit - discharge of dewatering and hydrostatic test waters from property to U.S. waters.	Utah Code 19-5; UPDES Rules Utah R317-8	Natural gas pipelines

Issuing Agency	Name and Nature of Permit/Approval	Regulatory Authority (if appropriate)	Applicable Project Component
	Approval order; permit for operation of certain stationary emissions sources; Air Quality Permit to Construct.	Utah Code Stationary Source Rules Utah R307-210; Operating Permit Rules Utah R307-415	All pollutant emission sources and construction activities associated with the Proposed Action or alternatives
	New Source Review Permit - controls emissions from new or modified sources.	New and Modified Source Permit Rules Utah R307-401	All pollutant emission sources and construction activities associated with the Proposed Action or alternatives
	Fugitive Dust Control.	Fugitive Dust Rules Utah R307-205	Construction of facilities and vehicle traffic
Local Permits, Approvals, and Authorizing Actions			
Uintah and Duchesne Counties	Conditional Use Permit - authorizes extraction and processing on private lands	Uintah and Duchesne county codes	Any project activities in residential or private lands
	Road Use Permit - authorizes overweight and over-length loads on county roads	Uintah and Duchesne county codes	Transportation of equipment and materials on county roads
	Road Opening Permit - authorizes pipeline crossings, routing of pipelines parallel to county roads, and tying a project access road to a county road.	Uintah and Duchesne county codes	Pipelines or project roads that cross or intersect with a county road
	Road Encroachment Permit - authorizes construction, maintenance, repair, operation, or use of any pole line, surface, or subsurface line in the ROW on affected county roads.	Uintah and Duchesne county codes	Construction or other activities that may tie into county roads
	Building Permit - controls construction of all structures in the county.	Uintah and Duchesne county codes	Construction of all buildings

1.7 INTERNAL SCOPING AND PUBLIC INVOLVEMENT

A BLM interdisciplinary team (IDT) reviewed the Proposed Action and identified a list of resources potentially impacted by implementation of the Project. These resources represent issues considered in all EAs and EISs and are discussed and analyzed in Chapters 3, 4, and 5 of this EIS. A listing of these resources and their status within the MBPA is presented in **Appendix A**. The resources and issues identified in this appendix documents all resources considered, including those resources which were determined to be "Not Present" (NP) or "Not Impacted" (NI) along with a rationale for that determination. Resources that would not be affected by the Project are not carried forward for detailed analysis in Chapters 3, 4, and 5 of this EIS.

BLM also conducted public scoping to solicit input and identify environmental issues and concerns associated with the proposed project. The public scoping process was initiated on August 25, 2010, with the publication of a Notice of Intent (NOI) in the Federal Register. The BLM prepared a scoping information notice and provided copies to the public, other government agencies, and Tribes. These announcements included information on a public scoping meeting and open house, which was held at the County Commissioner's Office in Duchesne, Utah, on September 13, 2010, and at the Western Park Convention Center in Vernal, Utah, on September 20, 2010. The scoping meetings included participants from the BLM, Ashley National Forest, Uintah County Public Lands, Newfield, El Paso County, consultants, local landowners, and other stakeholders. The official scoping period ended October 9, 2010.

Public response to the NOI and meetings included seven letters: two from federal agencies; one from a state agency; one from a county agency; and three from industry or private individuals. The following concerns were raised in the letters as issues to be addressed in, and/or concerns related to, the EIS:

- Comprehensive air quality analyses and region-wide air quality modeling;
- Direct and indirect effects of water injection and hydrogen sulfide on gilsonite mining operations;
- Incorporation of operational flexibility into the Record of Decision and Final EIS;
- Recognition of valid existing lease rights within the Project Area by BLM;
- Explanation of the positive air quality impacts and reduction in emissions that would result from electrification;
- Limited BLM statutory or regulatory authority to regulate air quality or enforce air quality laws;
- Economic benefits to the local and state economies and SITLA;
- Conformance of the proposed project to the Vernal RMP;
- Direct, indirect, and cumulative impacts to Waters of the U.S.;
- Direct, indirect, and cumulative air quality impacts, with an emphasis on fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), volatile organic compounds (VOC), and ozone;
- Protection of wetland, stream, and riparian resources;
- Alternatives for water treatment and produced water management;
- Protection of groundwater, drinking water, and irrigation water;
- Impacts of fugitive dust from construction and travel on unpaved roads;
- Impacts of noise from central facilities located near residences and wildlife in the MBPA;
- Analysis of proposed project development on water quality within Pariette Draw; and
- Potential introduction and expansion of noxious weeds in the MBPA.

The Notification of Availability for the Draft EIS was published on December 20, 2013. The Draft EIS was made available for a 45-day public comment period, which was subsequently extended by an additional 30 days at the request of the State of Utah. Three public meetings were held: one on January 21, 2014 in Salt Lake City, Utah; one on January 22, 2014, in Roosevelt, Utah; and one on January 23, 2014, in Vernal, Utah. A total of 22 unique comment letters or emails were received during the official comment period, and one letter was received after the comment period ended. The 23 comment letters or emails included one from a federal agency, one from the House of Representatives, one from a state agency, two from County governments, one from the proponent (Newfield), nine from other oil and gas industry representatives or trade groups, one from the proponent's outside legal counsel, one from a non-governmental organization, and six from private individuals. There were also 1,780 form letters received from members of the environmental community that expressed concern regarding ozone impacts, and 161 form letters received from Newfield employees that expressed concern over impacts to their livelihoods from the Agency Preferred Alternative. A detailed list of substantive comments received, and BLM's

response to those comments, is included in **Attachment 2** of this FEIS. Comments largely focused on the following:

- Comments stating that the Agency Preferred Alternative was technically flawed and would not meet the purpose and need for the project;
- Comments asking the BLM to adopt the No Action Alternative;
- Comments asking the BLM to adopt the Proposed Action Alternative;
- Direct, indirect, and cumulative impacts to Waters of the U.S.;
- Direct, indirect, and cumulative air quality impacts, with an emphasis on fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2), volatile organic compounds (VOC), and ozone;
- Limited BLM statutory or regulatory authority to regulate air quality or to enforce air quality laws;
- Economic benefits to the local and state economies and to SITLA;
- Protection of wetland, stream, and riparian resources;
- Alternatives for water treatment and produced water management;
- Protection of groundwater, drinking water, and irrigation water;
- Analysis of proposed project development on water quality within Pariette Draw; and
- Surface restrictions in the Pariette Wetlands ACEC and *Sclerocactus* core conservation areas.

1.8 EXISTING DISTURBANCE

As previously stated, the MBPA is an existing oil and gas field with substantial existing and ongoing oil and gas development. As of October 2014, there are approximately 3,725 acres of existing disturbance from well pads, access roads, pipeline and utility corridors, other oil and gas infrastructure, and livestock improvements. As of October 2014, according to the Utah Division of Oil and Gas Mining's database, oil and gas infrastructure within the MBPA consists of approximately 3,209 wells. A breakdown of existing well types within the MBPA is included in **Table 1.8-1**.

TABLE 1.8-1
EXISTING WELLS WITHIN THE MBPA

Well Type	Number
New Permit	2
Approved Permit	264
Drilling	41
Producing	1,290
Shut-in	135
Temporarily-abandoned	16
Plugged & Abandoned	41
Active	1,222
Inactive	1
Location Abandoned	189
Drilling Operations Suspended	8
TOTAL	**3,209**

There are approximately 634 miles of existing road within the MBPA, consisting of a combination of paved and/or improved roads, unimproved roads, and two-tracks. Miles of existing pipeline corridor are difficult to calculate, given that numerous miles have been buried and the surface reclaimed, and that surface-laid pipelines are difficult to see on aerial imagery. However, the miles of existing pipeline are probably similar to or greater than the miles of existing roads. Other existing infrastructure within the MBPA includes:

- One electrical sub-station/generation station;
- Nine injection facilities;
- One gas and oil separation plant;
- Two gas processing plants;
- One water supply well; and
- Three compressor stations.

Newfield is the primary operator within the MBPA; however, there are numerous lease owners within the Unit.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and three alternatives that include standard development and production activities for oil and gas resources in the MBPA. The range of alternatives was formulated to address issues and concerns raised during scoping, except for the No Action Alternative, which was included to provide a baseline for comparison of alternatives.

The alternatives include:

- Alternative A – Proposed Action (Newfield's Plan as constrained by the regulatory requirements listed in **Table 2.1-1**)
- Alternative B – No Action Alternative
- Alternative C – Field-wide Electrification
- Alternative D – Agency Preferred Alternative

Alternative A is derived from Newfield's proposed plan for oil and gas development. Alternative C is similar to Alternative A, except it would incorporate a component for field-wide electrification. Alternative D would generally incorporate similar construction, operational, decommissioning, and reclamation components as the Proposed Action and Alternative C, but with additional considerations to protect sensitive resources such as riparian habitat, 100-year floodplains, and threatened plant species. The BLM has identified Alternative D as the agency-preferred alternative, because it best addresses issues raised in scoping about potential impacts to resources while meeting the purpose and need for the Project. Alternatives A, B, C, and D have been revised and refined to reflect public comments received on the Draft EIS. The most extensive edits were applied to Alternative D.

Under Alternative B - No Action Alternative, the existing rate of drilling would continue under currently approved authorizations on Federal mineral estate. Development would continue on State and private lands or minerals. Reasonable access across BLM-administered surface to proposed well pads and facilities on State and private lands or minerals would continue under the No Action Alternative, as allowed by Federal regulations.

Each of the alternatives is discussed based on alternative-specific activities, schedule, design features, and surface disturbance. It should be noted that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities are conceptual at this point. These locations have been illustrated on the alternative-specific maps in this EIS (**Figures 2-1** through **2-4 – Attachment 1**) for analytical and impact evaluation purposes only. Actual locations for well pads, access roads, ROWs, and other surface facilities would be determined at the Project implementation phase.

2.1 MANAGEMENT ACTIONS COMMON TO ALL ACTION ALTERNATIVES

Table 2.1-1 provides a description of the regulatory requirements and standard operating practices that would be applied under all alternatives. The table is subdivided by requirements and commitments specific to pre-drilling, construction, drilling, completion, production, interim reclamation and maintenance, and final reclamation and abandonment. The measures listed under each of these stages are then further subdivided into a list of regulatory requirements.

TABLE 2.1-1
REGULATORY REQUIREMENTS COMMON TO ALL ACTION ALTERNATIVES

Implementing Authority/ Regulation/Statute	Description of Requirement
Pre-drilling	
U.S. Environmental Protection Agency (EPA) Spill Prevention Control and Countermeasures (SPCC) Regulations (40 CFR 112)	▪ Newfield would implement and adhere to SPCC plans and provide personnel with an orientation to ensure they are aware of the potential effects of accidental spills, as well as the appropriate recourse if a spill does occur (40 CFR 112). Newfield currently adheres to the EPA SPCC regulations through development of SPCC plans, ongoing training and routine inspections of all existing and new well sites/facilities that are subject to the rule. Newfield will develop Facility Response Plans (FRP) for each Gas Oil Separation Plant (GOSP) as required by 40 CFR 112.20 & 112.21.
Utah Department of Environmental Quality-Division of Water Quality (UDEQ-DWQ) and U.S. Army Corps of Engineers (USACE), Section 404, Federal Water Pollution Control Act (Clean Water Act) (33 USC 1251, et seq.)	▪ Any disturbances to wetlands and/or waters of the United States would be authorized by the UDEQ-DWQ, in cooperation with the USACE Office. Section 404 permits would be secured as necessary prior to disturbance.
Occupational Safety and Health Administration (OSHA) Regulations (29 CFR 1910.1200)	▪ Newfield would institute its own internal Hazard Communication Program (HCP) for its personnel and require that subcontractor programs be in compliance with Newfield's HCP. In addition, a Material Safety Data Sheet (MSDS) for every chemical or hazardous material brought on-site would be kept on-site or on file at Newfield's Field Office (FO).
BLM/U.S. Forest Service (USFS) Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 4	▪ Existing topography would be used to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view where practical. Newfield would paint all aboveground production facilities with approved colors (e.g. specified standard environmental colors) to blend with adjacent terrain, except for structures that require safety coloration in accordance with OSHA requirements.
Construction	
BLM, Onshore Oil and Gas Order No. 1 (43 CFR 3160)	▪ On federal land, operators would prepare and submit individual comprehensive drill-site design plans for BLM approval. These plans would show the drill location layout over the existing topography; dimensions of the locations, volumes, and cross sections of cut and fill; location and dimensions of reserve pits; existing drainage patterns; and access road egress and ingress. Plans and shapefiles would be submitted and approved prior to initiation of construction. ▪ Well pads and associated roads and pipelines would be located to avoid or minimize impacts in areas of important ecological value (e.g., sensitive species habitats and wetland/riparian areas).

Implementing Authority/ Regulation/Statute	Description of Requirement
BLM Manual 9113—Roads; BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 4	▪ Roads on BLM surface would be constructed as described in BLM Manual 9113. Running surfaces of roads may be graveled if the road base does not already contain sufficient aggregate. ▪ Existing roads would be used when the alignment is acceptable for the proposed use. Generally, roads would be required to follow natural contours and provide visual screening by constructing curves, etc. All roads on BLM-managed lands would be reclaimed to BLM standards.
BLM Manual, Section 8400 (43 CFR 2802); BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 4	▪ Pipeline rights-of-way (ROWs) would be located within existing ROWs whenever possible. Aboveground facilities that do not require safety coloration would be painted with appropriate non-reflective standard environmental colors, as specified by the authorized officer (AO). Topographic screening, vegetation manipulation, project scheduling, and traffic-control procedures may all be employed as specified by the AO to further reduce visual impacts.
BLM Regulations (43 CFR 2802) regarding applications for ROWs; BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 4	▪ Salvage and subsequent replacement of topsoil would occur for surface-disturbing activities wherever practical.
USACE, Section 404, Federal Water Pollution Control Act (Clean Water Act) (33 USC 1251, et seq.)	▪ Where disturbance of regulated U.S. waters cannot be avoided, Newfield would obtain CWA Section 404 permits as required. Operations would be conducted in conformance with the requirements of the approved permits.
BLM Regulations (36 CFR 800) implementing Section 106; National Historic Preservation Act (NHPA) (16 USC 470, et seq.)	▪ If cultural resources are located within frozen soils or sediments that preclude the possibility of adequately recording or evaluating the find, construction would cease and the site would be protected for the duration of frozen soil conditions. Recordation, evaluation, and recommendations concerning further management would be made to the AO following natural thaw. The AO would consult with the affected parties, and construction would resume once management of the threatened site has been finalized and a Notice to Proceed has been issued.
BLM Manual 9112 (Bridges and Major Culverts) and Manual 9113 (Roads); BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 4	▪ Streams/channels crossed by roads would have culverts installed at all appropriate locations as specified in BLM Manuals 9112 and 9113. Low-water crossings can be effectively accomplished by dipping the road down to the bed of the drainage.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 4	▪ Prudent use of erosion-control measures, including diversion terraces, riprap, matting, temporary sediment traps, and water bars, would be employed by Newfield as necessary and appropriate to control surface runoff generated at well pads. If necessary, Newfield would treat diverted water in detention ponds prior to release to meet applicable state or federal standards. ▪ Reserve pits would be constructed to ensure protection of surface water and groundwater. All reserve pits would be lined using liners of at least 16-mil thickness. Additional felt padding would be used as necessary, at the discretion of the AO.

Implementing Authority/ Regulation/Statute	Description of Requirement
	▪ Appropriate erosion control and revegetation measures would be employed. Grading and landscaping would be used to minimize slopes, and slope stabilizers would be installed on disturbed slopes in areas with unstable soils where seeding alone may not adequately control erosion. Erosion control efforts would be monitored by Newfield, and necessary modifications would be made to control erosion. ▪ Diversion structures, mulching, and terracing would be installed as needed to minimize erosion. In-stream protection structures (e.g., drop structures) in drainages crossed by a pipeline would be installed as appropriate to prevent erosion. ▪ Newfield would incorporate proper containment of condensate and produced water in tanks and drilling fluids in reserve pits and would locate staging areas for storage of equipment away from drainages to prevent potential contaminants from entering surface waters.
Drilling	
Utah Department of Transportation (UDOT) Standards and Specifications	▪ Load limits would be observed at all times to prevent damage to existing road surfaces. Special arrangements would be made with UDOT to transport oversize loads to the Project Area.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book") Chapter 4 & 5; BLM Notice to Lessees 3-A (NTL 3-A); BLM WO Instruction Memorandum 99-061 Onsite Bioremediation of Exploration and Production Wastes or Spills of Crude Oil – Development of State Office Level Policies	▪ Any accidental soil contamination by spills of petroleum products or other materials would be reported to the appropriate authorities and cleaned up by Newfield. The soil would be disposed of or remediated according to applicable rules. Spills of at least 10 barrels in non-sensitive areas would be reported to the BLM AO in a written report and to other appropriate authorities. Major undesirable events of 100 barrels or more must be reported to the AO within a maximum of 24 hours; however, if the event is entirely contained within the facility firewall, it may be reported only in writing pursuant to Section III of NTL-3A. Any spill which occurs in a sensitive area, regardless of the volume involved, must be reported to the AO within 24 hours.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book") Chapters 4 and 5; WO-IM-2013-033 Fluid Minerals Operations – Reducing Preventable Causes of Direct Wildlife Mortality; U.S. Migratory Bird Treaty Act (16 USC 703-712)	▪ Pits would be fenced as specified in individual authorizations. Any pit containing hazardous fluids would be maintained in a manner that would prevent migratory bird mortality. ▪ After cessation of drilling and completion operations, any visible or measurable layer of oil must be removed from the surface of the reserve pit, and the pit must be kept free of oil. ▪ Pits must be free of oil and other liquid and solid wastes prior to filling. Pit liners must not be breached (cut) or filled (squeezed) while still containing fluids. The pit liner must be removed to the solids level or treated to prevent its reemergence to the surface or to prevent its interference with long-term successful revegetation. ▪ Closed-loop drilling would be used to protect natural water courses and groundwater from contamination.
BLM COA attached to approved Application for Permit to Drill (APD)	▪ If reserve pit leakage is detected, then discharge into the pit would cease as directed by the BLM until the leakage is corrected.
Utah Division of Water Rights (Utah Administrative Code, Title 73)	▪ All water used in association with this project would be obtained from sources approved by the Utah State Engineer's Office.

Implementing Authority/ Regulation/Statute	Description of Requirement
Regulations (40 CFR 335) implementing Title III, Superfund Amendments and Reauthorization Act of 1986 (SARA) (42 USC 103)	▪ Chemicals would be inventoried and reported by Newfield in accordance with SARA Title III. If quantities exceeding the threshold planning quantity are to be produced or stored at any time within the Project Area, Newfield would submit appropriate Section 311 and 312 forms at the required times to the State Emergency Response Commission, Local Emergency Planning Committees, and the local fire departments.
EPA Resource Conservation and Recovery Act of 1976 (42 USC 6901, et seq.), DOT (49 CFR 177)	▪ Newfield would transport and/or dispose of any hazardous wastes as defined by the EPA RCRA, as amended, in accordance with all applicable federal, state, and local regulations.
Completion	
BLM Onshore Oil and Gas Order No. 2 (43 CFR 3163 and 3165)	▪ Newfield would case and cement all oil and gas wells to protect subsurface mineral and usable water zones. The BLM will require an operator to conduct cement bond log surveys, or other tests to verify cement adequacy.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 6; and Onshore Oil and Gas Order No. 1 (43 CFR 3160)	▪ Wells that have completed their intended purpose would be properly abandoned and plugged according to regulations governing plugging and abandonment identified by the BLM and/or UDOGM for State and private mineral estate.
BLM COA for APD (for wells/reserve pits located on BLM lands), and UDOGM (Utah Administrative Code R649-3-16) (for wells/reserve pits located on State and private lands)	▪ Following drilling and completion of the well, produced water will be removed within 90 days from the reserve pit, which will be closed within 6 months (BLM) and recontoured within 180 days (UDOGM), unless permission is granted by the BLM and/or UDOGM for a longer period. The pit contents must meet the UDOGM's cleanup levels (Environmental Handbook, January 1996) or background levels prior to burial. The contents may require treatment to reduce mobility and/or toxicity to meet cleanup levels. The alternative to meeting cleanup levels would be transporting material to an approved disposal facility. BLM would generally defer to UDOGM's preference, which would be for materials to remain on site if possible.
Production and Maintenance	
BLM Onshore Oil and Gas Order No. 7 (43 CFR 3160)	▪ Produced water from oil and gas operations would be disposed of in accordance with the requirements of Onshore Oil and Gas Order No. 7.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 6; and Onshore Oil and Gas Order No. 1 (43 CFR 3152)	▪ At producing wells, Newfield would reduce slopes to original contours (not to exceed 3:1 slopes where feasible). Areas not used for production purposes would be reclaimed, blended into the surrounding terrain, and reseeded, and installed with erosion control measures. These erosion control measures may be necessary after slope reduction. Mulching, erosion control measures, and fertilization may be necessary to achieve acceptable stabilization.
EPA SPCC Regulations (40 CFR 112)	▪ All storage tank batteries, treaters, dehydrators, and other production facilities that have the potential to leak or spill any oil, glycol, or other fluid that may constitute a hazard to public health or safety would be contained within the pad that would be surrounded by a berm along its entire perimeter. The berm would

Implementing Authority/ Regulation/Statute	Description of Requirement
	function as an appropriate containment and/or diversionary structure that would be constructed to prevent discharges from a primary containment system from draining, infiltrating, or otherwise escaping to ground or surface waters prior to completion of cleanup.
BLM Notice to Lessees 3-A (NTL 3-A)	▪ Notice of any spill or leakage (as defined in the BLM Notice to Lessees (NTL) 3A) would be immediately reported by Newfield to the AO. as well as to other appropriate federal and state officials as required by law. Oral notice would be given as soon as possible but within no more than 24 hours, and those oral notices would be confirmed in writing within 72 hours of any such occurrence.
EPA	▪ Newfield would obtain all necessary air quality permits from the EPA to construct and operate facilities.
Utah Department of Environmental Quality-Division of Air Quality (UDEQ-DAQ)	▪ Newfield would obtain all necessary air quality permits from UDEQ-DAQ to construct and operate facilities.
Final Reclamation and Abandonment	
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 6; Onshore Oil and Gas Order No. 1 (43 CFR 3160)	▪ Abandoned sites would be reclaimed in accordance with the approved APD and the Subsequent Report of Abandonment (Sundry) process. Once successful reclamation has been achieved, Newfield would submit a Final Abandonment Notice (FAN) for approval by the AO prior to bond release.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 3	▪ All disturbances would be managed and reclaimed to minimize runoff from the well pads or other facilities until the area is stabilized.
BLM/USFS Surface Operating Standards for Oil and Gas Exploration and Development ("Gold Book"), Chapter 6; Onshore Oil and Gas Order No. 1 (43 CFR 3160)	▪ All excavations and pits would be closed by backfilling and contouring to conform to surrounding terrain. The Surface Use Plan of Operations (SUPO) would outline objectives for successful reclamation of well pads and other facilities, including soil stabilization, plant community composition, and desired vegetation density and diversity.
Common to All Project Phases	
Section 7(a) of the Endangered Species Act of 1973 (ESA), as amended	▪ Section 7(a) of the ESA requires federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened, and with respect to its critical habitat, if any has been designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 CFR 402. Section 7(a)(2) requires federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a federally listed species, or result in the adverse modification or destruction of its critical habitat. Section 7 Consultation would be conducted as necessary.
BLM Regulations (36 CFR 800) implementing Section 106, NHPA (16 USC 470, et seq.)	▪ Newfield would conduct all operations in conformance with Section 106 regulations (36 CFR 800) of the NHPA, as amended.

Implementing Authority/ Regulation/Statute	Description of Requirement
BLM Handbook (H-8270-1), General Procedural Guidance for Paleontological Resource Management	▪ Newfield would conduct all operations in conformance with BLM Handbook (H-8270-1).
BLM Handbook 9011-1, Exec Order 13112, Carlson-Foley 1968, and the Plant Protection Act of 2000, Public Law 106-224, and Fed Noxious Weed Act of 1974 as amended	▪ Newfield would obtain a Pesticide Use Proposal (PUP) prior to applying herbicides or pesticides. Newfield would treat project-related noxious weeds as required by all applicable regulations.
Clean Air Act (CAA), as amended, and the Federal Land Policy and Management Act (FLPMA)	▪ Newfield would conduct an annual emissions inventory and compare the inventory to the emissions estimates contained in this EIS. The inventory would be conducted annually for the life of the project (LOP) until the EPA/UDEQ/BLM develop an approved basin-wide control plan covering oil and gas development in the Uinta Basin. ▪ Regional photochemical modeling would be conducted that includes emissions for the selected alternative within one year of the ROD for this project or within one year of the BLM Air Resources Management Strategy (ARMS) modeling platform becoming available, whichever occurs first. If modeled impacts show that the National Ambient Air Quality Standards (NAAQS) or applicable thresholds for air quality related values may be exceeded, BLM will require additional mitigation measures within BLM's authority to prevent exceedances (for example requiring Newfield to implement an ozone mitigation contingency plan as described below). ▪ As needed, the BLM, with input from UDEQ-DAQ and EPA as appropriate, will refine the NOx and volatile organic compound (VOC) emissions inventory. The BLM, in coordination with UDEQ-DAQ and EPA as appropriate, will ensure that new modeling includes feasible best available control technology (BACT) requirements and a sensitivity analysis to determine appropriate reductions in ozone precursor emissions. The BLM, in coordination with UDEQ-DAQ and EPA as appropriate, will evaluate the modeling results. ▪ As soon as possible, and if needed following evaluation of the modeling results, the BLM, in coordination with UDEQ-DAQ and EPA as appropriate, will use their respective authorities to implement emission control strategies and/or operating limitations necessary to ensure compliance with applicable ambient air quality standards for ozone. Absent an effective technology to implement, reductions in the pace of development may be used to ensure ambient air quality standards are met. ▪ Newfield would implement project-specific enhanced mitigation measures to address winter ozone formation that includes the following: o FLIR/AVO inspections of pneumatic devices, pumps, tanks, and fugitives at least annually during January to March. o Perform regular maintenance on emitting devices and properly operate and maintain existing installed control equipment

Implementing Authority/ Regulation/Statute	Description of Requirement
	○ Provide ozone training for operations personnel prior to the ozone season. ○ Implement work practices during the winter ozone period to reduce potential emissions, including charging desiccant dehydration units prior to the winter ozone period, reducing glycol dehydration circulation rates, minimizing blow-down actions, reducing the number of failed compressor startups, reducing compressor startups by performing maintenance during scheduled shutdowns, delaying optional activities that could cause emissions, and taking extra care to ensure maintenance and operation of equipment during winter ozone alert days. ○ The BLM may add, delete, or otherwise modify the enhanced mitigation measures to conform to the requirements or recommendations of a regulatory basin-wide management plan. ▪ The BLM will work with the appropriate regulatory agency to ensure monitoring and enforcement of mitigation measures occurs.
BLM MOU WO-230-2010-04, MOU between the BLM and the USFWS to Promote the Conservation of Migratory Birds	▪ BLM shall implement the MOU to the extent permitted by law and in harmony with agency missions, subject to the availability of appropriations and budgetary limits. At the project level, BLM will evaluate the effects of agency actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurably negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. In such situations, BLM will implement approaches lessening such take.

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2.2 DEVELOPMENT ACTIVITIES COMMON TO ALL ACTION ALTERNATIVES

Newfield is proposing to expand its ongoing oil and natural gas development and secondary recovery within the MBPA using waterflood methods and deep gas operations. Waterflood methods involve the injection of produced water and freshwater (through formerly producing or new wells) into the oil-producing geologic formation. Nearby actively producing wells extract the fluids through the formation as the water displaces the oil. In addition, portions of the MBPA along the northwest and southern Project boundaries would be subject to expansion away from existing development.

Newfield proposes to drill new wells as infill to all productive formations, including but not limited to the middle and lower members of the Green River formation and upper member of the Colton Formation. The Green River oil wells would be drilled to a total depth of between 4,500 and 6,500 feet below ground surface (bgs), and the proposed deep gas wells would be drilled to a total depth of between 13,000 and 18,000 feet bgs.

Alternative maps (see **Figures 2-1** through **2-4 – Attachment 1**) indicate conceptual locations of potential well pads from which oil and natural gas resources could be developed. Per comments received by the BLM from the State of Utah, a Cooperating Agency on this EIS, the State assumes that Newfield would assume full recovery of State mineral resources under any of the alternatives. The extent of such development and prospective nature of the resources is based on three-dimensional (3D) seismic data, geologic information, data derived from wells drilled to date, and economic factors.

Well density in the MBPA would vary based on geologic characteristics of the formation being targeted for development. The range of downhole well densities expected at this time is one well per 20 acres (i.e., middle member of the Green River Formation) to one well per 40 acres (i.e., middle and lower members of the Green River Formation). The ultimate number and density of wells would be defined through future drilling and would vary by alternative. Newfield would use directional drilling and multiple well pad drilling techniques to develop these resources in a manner that would limit the number of well pads or surface locations (i.e., surface density) to a maximum of one well pad per 40 acres.

The number and types of wells per well pad would vary based on downhole spacing, technical feasibility, and the geologic characteristics of the targeted formation. Some well pad locations would host a single well, and others may have multiple wells drilled from a single well pad.

Figure 2.6-1 shows the existing high- and low-density development areas within the MBPA. High-density development areas are those areas that have from six to 16 well pads per 640-acre section (i.e., one well pad per 40 to 106 acres). Low-density development areas are those areas that have had no gas development at all or contain up to five well pads per section.

Of the 197 sections or portions of sections within the MBPA, 115 (about 58 percent) are within the high-density development areas. Average existing surface disturbance within the high-density development areas is 39.0 acres per section, and the average number of well pads per section is 14.3. Approximately 82 sections or portions of sections occur within the low-density development areas. The average existing disturbance within the low-density development areas is 11.9 acres per section, and the average number of existing well pads per section is 2.8.

The life cycle of an individual well and its associated facilities/required infrastructure (e.g., roads, pipelines, and compressor stations) is composed of seven primary phases: (1) preconstruction, (2) construction, (3) drilling, (4) completion, (5) interim reclamation, (6) production and maintenance, and (7) final reclamation and abandonment. Specific details of these seven primary phases that are common to all action alternatives are described in the following sections.

2.2.1 Preconstruction Activities

2.2.1.1 Surveying and Notice of Staking or Application for Permit to Drill

Prior to the start of construction activities on BLM-managed lands, Newfield would initiate the well-permitting process by filing either a NOS or an APD with the BLM VFO, which would start the application process to ensure that it meets applicable requirements. For wells on split estate lands, Newfield would follow the requirements of *Section VI, Onshore Oil and Gas Order No. 1*, for notifying and obtaining an access agreement with the surface owner.

A complete APD normally consists of a SUPO, Drilling Plan, evidence of bond coverage, shapefiles, and other information required to comply with *Onshore Oil and Gas Order No. 1*. A SUPO contains information describing construction operations, access, water supply, well site layout, production facilities, waste disposal, and restoration/revegetation or reclamation associated with the site-specific well development proposal. The Drilling Plan typically includes information describing the technical drilling aspects of the specific proposal, safety specifications, and subsurface resource protection. Determination of the suitability of Newfield's design, construction techniques, and procedures would be made by the appropriate AO during the initial permitting process. This Federal Oil and Gas Onshore Order applies to federal minerals.

2.2.1.2 On-Site Inspection and Construction Initiation

Prior to APD approval and construction, Surface Management agency (SMA) personnel would conduct on-site inspections to assess potential impacts and recommend additional methods to mitigate impacts. The SMA may impose COAs to the APD based on site-specific analysis and the NEPA process. These additional environmental protection measures would cover all aspects of oil and gas development, including construction, drilling, production, reclamation, and abandonment. The SMA would arrange a date, time, and place to meet with Newfield to perform an on-site inspection. Survey stakes, with cut and fill footages, would be used to indicate the orientation of the well pad, and flagging would be used to indicate the routing of access roads, pipelines, or other linear features.

Changes or modifications would be made during the inspection, if needed, to avoid or mitigate impacts to natural and cultural resources. Cut and fill and construction issues also would be addressed, as necessary. For wells on BLM-managed leases, provisions of 43 CFR 3101.1-2 and the BLM standard lease (Form 3100-11) allow for the relocation of the proposed well by up to 650 feet and a subsequent delay in operations of up to 60 days.

2.2.2 Proposed Construction Activities

2.2.2.1 Well Pads

Prior to well pad construction or surface-disturbing activities, Newfield would obtain approval of an APD by the BLM AO. The APD would contain site-specific COAs that would apply to construction and well operations. Construction of well pads would typically begin with stripping and stockpiling topsoil. The top 4 to 6 inches of topsoil material (preferably all topsoil) would be stockpiled for use in interim reclamation.

Following topsoil removal and stockpiling, each well pad would be constructed using standard cut-and-fill techniques to create a level pad needed for drilling operations. With associated cut and fill slopes, single

Green River oil wells with a 40-acre surface density would be constructed to average dimensions of approximately 225 feet x 400 feet (2 acres in size), while vertical deep gas wells with a 40-acre surface density would be constructed to average dimensions of approximately 275 feet x 475 feet (3 acres in size). Well pads hosting multiple wells and/or horizontal wells would be approximately 0.2 acres per well larger than the 2 to 3-acre average.

Primary surface equipment to be installed at each well pad would include a drilling rig, reserve pit or closed-loop system, mud tank, dog house flare pit, pipe racks, pump house, trailers, water storage tanks, and generators. The typical layout for a single well pad is illustrated in **Figure 2.2.2.1-1 (Attachment 1)**.

Fill slopes, where necessary, would be compacted and maintained to maximize slope stability and minimize erosion. Where cut and fill slopes are required, they would be constructed at no steeper than a 3:1 ratio. Engineering design would ensure that cut and fill volumes of soils would generally be balanced to ensure all materials generated during construction are used to the greatest extent practicable, and that few or no spoil piles remain.

Once the pad has been leveled and graded, it would be compacted to establish a level and solid foundation for the drilling rig. The site preparation process would take approximately 3 to 4 days to complete. The well pad would be constructed to prevent surface run-on by channeling flow within diversion ditches and energy dissipaters (if needed) around the site and then released to grade, consistent with Best Management Practices (BMPs) for erosion control.

Under each alternative, the number of well pads constructed per section or in a given area (and associated number and type of wells drilled from that pad) is an assumption for analysis purposes. The actual number of well pads per section or in a given area may vary due to resource restrictions, but BLM does not anticipate that this variation would result in an exceedance of the overall numbers assumed for analysis.

2.2.2.2 Reserve Pits and Flare Pits

The reserve pit would be constructed on the well pad for the containment and temporary storage of drill cuttings and drilling mud for no more than 90 days (43 CFR 3160.7). The reserve pit would be sized appropriately depending upon the number and type of wells that would be drilled from the individual well pad. The largest proposed reserve pit would be approximately 185 feet long by 100 feet wide by 8 feet deep and would hold approximately 830,338 gallons. All reserve pits would be designed to maintain a two-foot freeboard[1].

Where possible, reserve pits would not be constructed in fill material. Where cut material locations are not possible, or where sensitive areas exist, a closed-loop system, with above ground tanks in lieu of a pit, would be considered at the discretion of the AO. The reserve pit would be constructed by mechanical compaction and lined to prevent loss of drilling water. The pits would be lined with a reinforced polyethylene liner a minimum of 16-mil thickness, with sufficient bedding used to cover any rocks. The liner would overlap the pit walls and be anchored with dirt and/or gravel to hold it in place. The reserve pit would be constructed and operated in accordance with UDOGM rule R649-3-16 – *Reserve Pits and Other On-site Pits* and in accordance with *Surface Operating Standards and Guidelines for Oil and Gas*

[1] Freeboard is the vertical distance between the normal maximum level of the water surface in a channel, reservoir, tank, canal, etc., and the top of the sides of a levee, dam, etc., which is provided so that waves and other movements of the liquid will not overtop the confining structure.

Exploration and Development (BLM 2007a). This publication will be referenced hereafter as the *Gold Book*. The *Gold Book* provides practices and standards to guide compliance with applicable agency policy, operating guidelines, and BMPs. The reserve pit would be fenced on three sides during drilling to prevent wildlife or livestock from entering the pit. Once drilling is complete, all sides would be fenced. Recontouring would be completed within 180 days.

2.2.2.3 Access Roads

A network of roads already exists within the MBPA. These roads would be used as is or upgraded where needed to access well pads or other surface facilities. New roads would be constructed only where necessary, because new roads have been sited and designed to minimize disturbances and maximize transportation efficiency. New roads would be built and maintained to provide year-round access, as necessary. Bulldozers, graders, and other types of heavy equipment would be used to construct and maintain the road system.

All access roads would be constructed out of native material and to the standards outlined in the *Gold Book*. Following staking of the road corridor and on-site review, the road design plan would be approved and any engineering needs specified. After road approval, standard cut and fill construction methods and construction equipment would be used to construct new roads. A typical roadway cross-section with width specifications is shown in **Figure 2.2.2.3-1 – Attachment 1**.

All roads would be constructed with appropriate drainage and erosion control features (e.g., cut and fill slope and drainage ditch stabilization, relief and drainage culverts, wing ditches, and rip-rap). Where needed, road base or gravel would be placed on upgraded and newly-constructed roads to provide a stable travel-way surface. Aggregate for road surfacing would be obtained from existing, permitted quarries from permitted sources. Aggregate would be of sufficient size, type, and amount to allow all-weather access and to minimize fugitive dust.

In steep terrain, a construction technique known as side casting (using the material taken from the cut portion of the road to construct the fill portion) would be used. Slightly less than half of the roadbed would be placed on a cut area; the remainder would be placed on a fill area. Soil texture, steep road grades, and moisture conditions would dictate whether the access road would be surfaced with commercial road base or shale. Water or other approved surfactants, such as magnesium carbonate, would be used to control dust during construction.
All necessary County planning and zoning permits would be secured prior to road construction, and maintenance agreements would be signed with the counties where Class B and Class D county roads would be used for daily operations in the MBPA. These agreements would include provisions for the maintenance and upkeep of county roads by Newfield to enhance their functional use and safety. All roads would meet minimum *Gold Book* and BLM Manual 9113 standards for construction.

The number of pipelines and utilities required, and the spacing between pipelines, utilities, and roads required for safe operations, would define the necessary corridor width. Where new co-located roads and pipeline ROWs are proposed, an initial disturbance corridor up to 100 feet in width would be needed for construction purposes. Of the initial 100-foot wide corridor, a 40-foot width would be used for road construction, and 30-foot-wide corridors on each side of the road would be used for the installation of pipelines (see **Section 2.2.2.4**). One side of the road would be used for both buried and surface lines where possible, and both sides of the road would be used as necessary based on existing infrastructure or topography. Typically, a buried pipeline is installed directly adjacent to the road and in bar ditch that is 10

to 15 feet wide. The 30-foot-wide corridor is allowed for construction and does not reflect the entire width of disturbance in the ROW.

Existing road ROWs would require an expansion width of approximately 70 feet, of which 10 feet would be needed for general road improvements (i.e., recontouring, borrow ditches, and stormwater management) and the remaining 60 feet would be used for the installation of pipelines. Following reclamation, a 10-foot width would remain for the long-term road ROW in addition to the existing road width, and a 25-foot width would remain for the long-term pipeline ROW. A typical roadway cross-section with pipeline installation alongside the road is shown in **Figure 2.2.2.3-2 – Attachment 1**.

Construction of new roads or upgrading of existing roads would typically take 1 to 2 days per mile of road. Primary access roads/trunk roads (i.e., those providing access through the MBPA or to multiple well pads) or roads constructed or upgraded in steep terrain would require more time to complete - approximately 2 to 3 days per mile of road. Spur roads to individual well pads would be constructed immediately prior to well pad construction. For trunk roads, several crews could operate simultaneously on different roads or different portions of the same road. Total personnel working on trunk road construction or improvements could range in size from 10 to 25 individuals. Each spur road workforce would include an average of five personnel to operate the equipment.

2.2.2.4 Pipelines

The existing pipeline gathering system within the MBPA would be expanded as development progresses. Proposed pipelines for new development would be integrated into the existing pipeline network within the MBPA. These include gas and liquid gathering pipelines, water injection pipelines, produced water pipelines, and fuel lines. Water distribution lines, injection lines, and high-pressure gas pipelines would be buried, while oil gathering lines, low-pressure gas lines, and fuel lines would be installed on the ground surface.

Pipeline expansion would typically be accomplished by looping or paralleling existing lines with additional lines and by adding compressors within the existing and planned facilities. A loop pipeline is defined as a pipeline that is constructed near an existing pipeline, which is placed in service concurrently for the purpose of adding capacity to the existing system.

All high-pressure gas lines would be buried unless constrained due to topography or surface geology. All low-pressure gas lines would be placed on the surface. New gas gathering lines would be constructed of steel pipes from 4 to 10 inches in outer diameter. Each gathering line would tie into a larger 10- to 16-inch outer diameter trunk line that would eventually transport the gas to compression facilities located in or near the MBPA. Typical pipeline installation scenarios with width specifications are shown in **Figure 2.2.2.3-2** and **Figure 2.2.2.4-1 – Attachment 1**.

Water pipelines would be needed to transport produced water to the water treatment facilities and to transport fresh and recycled water to the injection wells for waterflood purposes. Water pipelines would be from 4 to 8 inches in diameter and constructed from steel and/or polypropylene. These water pipelines would be buried to prevent freezing and would be installed in conjunction with (alongside) the high-pressure gas gathering pipelines, where possible.

Surface gathering lines would be buried where they intersect with access roads. Each pipeline ROW could include multiple gas gathering pipelines (both low and high pressure systems with potential loop lines), fuel gas pipelines, oil gathering pipelines, as well as produced water and water injection pipelines. This would

initially involve widening the disturbance corridor along the existing roadway by approximately 60 feet to accommodate the proposed gas gathering pipelines and water pipelines. Following pipeline installation, approximately 35 feet (or more if buried) of the pipeline ROW width could be reclaimed, leaving a 25-foot width for the long-term pipeline ROW[2].

In limited situations (for example, to reduce total pipeline length), a proposed pipeline ROW would be installed independent of an access road. Pipelines installed independent of roads (e.g., cross-country pipelines, or water pipelines for the water collector well) is anticipated for fewer than 10 percent of all pipelines under any of the alternatives.

The decision to bury a cross-country pipeline versus laying it on the surface would depend upon the alternative selected, soil conditions, terrain, and product being piped. New cross-country pipelines would require a 40- to 50-foot-wide construction ROW, depending on whether they are laid in the surface or buried. The exact location of pipelines would be determined at the time of the on-site inspection with the appropriate SMA. As conceptual locations for cross-country pipelines are not yet known, they are not reflected in the alternative-specific maps. A rough estimate of disturbance from cross-country pipelines is included in the narrative description of each alternative, but it is not reflected in the GIS-based surface disturbance tables or the resource-specific surface disturbance calculations in Chapter 4.

Generally, pipeline construction would occur in a planned sequence of operations along or within road ROWs. For buried pipelines, the pipeline trench would be first cleared of vegetation by blading the surface only if necessary to stabilize equipment. The pipeline trench would then be excavated mechanically with either a trencher or backhoe to a depth of approximately 36 inches. The width of the trench would range from approximately 18 to 36 inches, depending on the number of co-located pipelines and the diameter of pipe placed in the trench bottom. Pipe laying activities would include pipe stringing, bending, welding, coating, lowering of pipeline sections into the trench, and backfilling. Surface pipelines adjacent to roads would be assembled on the roadway or construction ROW, lifted, and placed in the existing vegetation using a side-boom.

Each gathering pipeline would be tested with pressurized fresh water or air to locate any potential leaks. Fresh water used for hydrostatic testing would be obtained from existing, permitted water supply sources (see **Table 2.2.8-1**). These sources would consist of both ground water from wells, surface withdrawals from permitted sources, and from Newfield's proposed water collector well along the Green River. Withdrawals would be made from suppliers that hold existing water rights permits through the Utah Division of Water Rights. After completion of hydrostatic testing, waste water would be taken to Newfield's water injection facility, where it would be treated and reused for waterflood purposes.

2.2.2.5 Compressor Stations

Newfield would expand up to three existing compressor stations and construct up to 21 new compressor stations to accommodate oil and gas production in the MBPA, depending on which alternative is selected. Expansion plans for the existing compressor stations would include the installation of additional compressor units or replacing smaller capacity units with larger ones. Each new compressor would be built with up to 8,000 horsepower (hp) of compression. Compressor station locations would be constructed similar to well pads as described in **Section 2.2.2.1**. Each site would be constructed to approximately 730 feet x 600 feet

[2] The term ROW is used throughout this document to describe access road, pipeline, and utility line corridors, even though a true BLM ROW may not be required.

(10 acres in size). Surface disturbance of existing compressor stations would be approximately 2.8 acres per facility.

Associated equipment to be installed at each compressor station would include an inlet separator (unfired); a 50-million standard cubic feet per day (MMscf/d) dehydrator; four 400-bbl atmospheric production tanks; one flare (used for emergency relief); one vapor control unit used to control stock tank and dehydrator emissions; and dew point control equipment with a pressurized natural gas liquid (NGL) storage bullet and associated truck loading rack. A typical layout for a compression station is shown in **Figure 2.2.2.5-1 – Attachment 1**.

Existing compressor stations for the Green River wells within the MBPA would be expanded by approximately 5 acres each to accommodate additional facilities, which would include up to 5,000 hp of additional compression. The expanded compressor stations would occupy approximately 10 acres and include up to 8,000 hp of compression. Primary equipment to be installed at each expanded compressor station would include an inlet scrubber, one 50-MMscf/d dehydrator, four 400-bbl atmospheric production tanks, an emergency flare and a vapor control unit, and one gas conditioning refrigeration unit with a pressurized NGL storage bullet and associated truck loading rack.

2.2.2.6 Central Gas Processing Plant

Following compression, gas would be transported by a 10-inch gas gathering line to one proposed centralized gas processing plant that would be constructed to process up to 50 MMscf/d. The conceptual location for the proposed gas processing plant is presented on **Figures 2-1** through **2-4 – Attachment 1**. Construction of the proposed gas processing plant would be essentially the same as that previously described for the well pad and compressor station sites (see **Section 2.2.2.1**).

The processing plant would occupy an approximate 10-acre site. Primary surface equipment to be installed would include four 300-hp compressors; one flare; one vapor control unit; one 50-MMscf/d dehydrator; and one load out rack. Surface disturbance of the existing gas processing plant would be approximately 3.2 acres.

2.2.2.7 Water Treatment and Injection Facilities

Newfield would construct up to seven new water treatment and injection facilities within the MBPA, and expand six existing facilities. The proposed water treatment facilities would be used for recycling of produced water that either would be co-mingled with fresh water and piped for waterflood injection wells or would be trucked from the facility to be used at subsequent wells for completion activities.

Construction of the proposed water treatment and injection facilities would be essentially the same as previously described for the well pad and compressor station sites (see **Section 2.2.2.1**). New water treatment and injection facilities would occupy an approximately 8-acre site. Existing treatment and injection facilities would be expanded by approximately 5 acres. Equipment at each facility would include four 500-hp main injection pumps, four 125-hp auxiliary injection pumps, up to six 500-bbl oil tank,; up to 10 500-bbl inlet water tanks, six to eight 5,000-bbl water storage tanks- one vapor control unit, and a natural gas-fueled generator for pumping.

Each treatment and injection facility would be connected to nearby proposed injection wells by a series of buried water injection pipelines. Water intended for dust suppression or reuse in drilling or completion activities would be trucked from the injection facilities to drilling locations. Produced water not suitable for waterflood purposes or dust suppression would be trucked from treatment and injection facilities to

permitted disposal wells within the MBPA. There are currently nine existing injection facilities which have disturbed an area of approximately 3.1 acres per location.

2.2.2.8 Gas and Oil Separation Plants (GOSPs)

Depending on the alternative selected, Newfield would construct and operate up to 12 (i.e., one existing and 11 proposed/approved) Gas and Oil Separation Plants (GOSPs). GOSPs would be used for the initial separation of produced water and gas from the oil prior to shipment for refining. Construction of the GOSPs would be essentially the same as that previously described for the well pad and compressor station sites (see **Section 2.2.2.1**). Each GOSP would occupy approximately 22 acres. There is one existing GOSP in the Project Area which has disturbed approximately 16 acres.

Surface facilities at each GOSP would consist of the following:

- Eight electric motor driven 200-hp pumps;
- Up to seven free water knock outs (FWKOs);
- Up to three heater treaters;
- Up to four 5,000-bbl oil tanks;
- One 5,000-bbl water tank;
- One emergency flare;
- Two vapor combustion units (VCUs);
- Tanker truck oil load out racks;
- Three 11-million British Thermal Units (MMBtu)/hr natural gas fueled process heaters;
- One primary and one backup 1,400 kW generators driven by gas fueled engines; and
- Two pipeline pig receivers.

Produced fluids consisting of black wax hydrocarbons, produced water and entrained natural gas gathered from wells in the MBPA would be delivered by pipeline to the GOSPs. The design process rate for each GOSP facility would be 10,000 barrels per day (bbls/day), consisting of approximately 5,000 bbls/day of oil and 5,000 bbls/day of produced water. As the MBPA field oil production rate continues to decline, the ratio of oil to produced water, and the oil-related volatile organic compound (VOC) emissions, would decrease over time. A typical layout for a GOSP is shown in **Figure 2.2.2.8-1 – Attachment 1**.

Each GOSP would be designed to minimize VOC emissions by eliminating hydrocarbon emission sources when possible, recycling hydrocarbon gas streams when feasible, and destroying excess hydrocarbons when necessary. The gas collected from the FWKOs and heater treaters would be captured and compressed for reuse or sale. The produced gas compressors would be driven by electric 200-hp motors. The captured produced gas would be recycled and used for fuel at each GOSP. Fuel would be treated by a sulfur removal tower prior to use. The sulfur removal tower is a closed unit and would have no emissions under normal operations.

Fuel gas from the MBPA system would normally augment the fuel gas supply at each GOSP. When produced gas volumes exceed the needed fuel at a GOSP, the excess gas would be routed to the existing wet gas gathering system for treatment and compression prior to sale.

2.2.2.9 Pump Stations

Newfield would construct up to six water pump stations to boost pressure to ensure consistent delivery of fresh and produced water to water treatment and injection facilities. Construction of pump stations would be essentially the same as that previously described for the well pad and compressor station sites. (See **Section 2.2.2.1.**) Pump stations would occupy approximately 3 acres. Pump station facilities would include one 200-hp water pump and up to two 400-bbl water storage tanks.

2.2.3 Well Drilling

Drilling operations would be conducted in two phases. A small conventional drilling rig, similar to a water well rig, would drill to a depth of approximately 600 to 1,000 feet bgs, or 50 feet below any usable water encountered. Water that is defined as "usable" has less than or equal to 10,000 mg/L total dissolved solids. Federal Safe Drinking Water Act regulations define an Underground Source of Drinking Water (USDW) as an aquifer or portion thereof: (a)(1) which supplies any public water system; or (2) which contains a sufficient quantity of ground water to supply a public water system; and (i) currently supplies drinking water for human consumption; or (ii) contains fewer than 10,000 mg/l total dissolved solids; and (b) which is not an exempted aquifer (See 40 CFR Section 144.3). The annular space between the borehole and the surface casing for the entire length of the surface casing would be sealed with cement to isolate any USDWs encountered near the surface. As the borehole is dug, the drilling mud between the casing and the borehole prevents migration of oil and gas to USDWs. When the well is cemented, the cement is inserted at the bottom of the hole under pressure, and as the cement rises, it forces the drilling mud up and out of the borehole. By using this procedure, there is never an open hole for oil or gas to migrate to USDWs. A cement bond log would be run to ensure that the seal is adequate. This part of the drilling operation would normally take 2 to 3 days to complete.

Upon completion of drilling the surface hole, a larger industry standard rotary drill would drill to the total target depth. Drilling operations would include: adding new joints of pipe at the surface as the hole deepens and using multiple casing strings when deemed necessary, circulating drilling mud to cool the drill bit and remove the cuttings, removing the drill string from the hole to replace worn drill bits, and setting production casing and cementing it in place. Well-specific casing designs and depths would be approved by the appropriate agencies during the APD process. Cement would overlap 200 feet into the previous casing strings annular space between the borehole and the production casing, isolating any USDWs encountered at depth with the method previously described. Green River oil wells would be drilled to a total depth of between 4,500 and 6,500 feet bgs, and the proposed deep gas wells would be drilled to a total depth of between 13,000 and 18,000 feet bgs, depending on the target formation.

Prior to drilling below the surface casing, a blow-out preventer (BOP) would be installed on the surface casing, and both the BOP and surface casing would be tested for pressure integrity. The BOP and related equipment would meet the minimum requirements of *Onshore Oil and Gas Order No. 2*. The BLM would be notified in advance of all pressure tests in order to witness those tests, if it so desired.

The drilling contractor may run a downhole mud motor to increase the penetration rate. The rig would pump fresh water as a circulating fluid to drive the mud motor, cool the drill bit, and remove cuttings from the wellbore. In order to achieve borehole stability and minimize possible damage to the hydrocarbon producing formations, a potassium chloride substitute and commercial clay stabilizer may be added to the drilling fluid. In addition, 10 to 20 gallons of polyacrylamide polymer (PHPA) per 1,000- bbls could be added to the drilling fluid to provide adequate viscosity to carry the drill cuttings out of the wellbore. From time to time, other materials may be added to the fluid system, such as sawdust, natural fibers, or paper

flakes, to reduce downhole fluid losses. In addition, with deeper wells, barite weighting material may need to be added to the mud system to control formation pressures and to provide borehole stability.

Upon drilling each well to an intermediate depth, a series of logging tools would be run in the well to evaluate the potential hydrocarbon resource. Steel production casing would then be run and cemented in place from surface to an intermediate depth in accordance with the well design, and as approved by the BLM in the APD and any applicable COAs. The casing and cementing program would be designed to isolate and protect USDW formations encountered in the wellbore, to prohibit pressure communication or fluid migration between zones by using the resource protection guidance outlined in *Onshore Oil and Gas Order No. 2* and UT IM 2010-055, and to provide a structural platform to attach well control equipment. The types of casing used, and the depths to which they are set, would depend upon the physical characteristics of the formations that are drilled and would be specified in the APD for each well. All casing would be new or inspected previously used casing. Where necessary, intermediate and/or production casing would subsequently be run to total depth. The BOP equipment would be re-tested prior to drilling the final section of the well below the intermediate casing point.

Following the completion of drilling operations and prior to running the casing to total depth, open hole well logs may be run to evaluate a well's production potential. If the evaluation concludes that adequate hydrocarbon resources are present and recoverable, then steel production casing would be run to total depth and cemented in place, in accordance with the well design and as approved by the BLM. The casing and cementing program would be designed to isolate and protect the formations, members, or zones potentially containing usable water, oil, gas, or prospectively valuable deposits of other minerals encountered in the wellbore and to prohibit pressure communication or fluid migration between zones.

Drilling operations would occur on a 24-hour per day basis. Drilling activities would take approximately 5 days for a vertical or a directional Green River oil well, 21 days for a horizontal Green River oil well, and approximately 55 days for a vertical deep gas well. Drilling activities would require approximately 12 personnel per well. An average of 360 wells would be drilled per year: therefore, up to eight drill rigs (i.e., four Green River oil rigs and four deep gas rigs) could be in the MBPA at any given time.

Drilling would be conducted in compliance with all Federal rules and regulations, including Federal Oil and Gas Onshore Orders, all State UDOGM rules and regulations, and all applicable local rules and regulations. Site-specific descriptions of drilling procedures would be included in the APD, and additional regulatory measures may be specified in the COAs for each well. Information relative to size of the borehole (usually 5 to 24 inches), casing, and cementing would also be contained in the site-specific APDs.

In the event it becomes necessary to flare a well, flare lines would be directed to flare pits to avoid environmental damage and as required by regulations. A deflector and/or directional orifice would be used to safeguard project personnel and other natural resources.

An example well bore diagram is provided in **Figure 2.2.3-1 (Attachment 1)**.

2.2.4 Well Completion

After a well is drilled and production casing is set, a completion unit would be moved on location to perforate and stimulate the reservoir. The casing would be perforated across the productive zones, followed by a stimulation treatment of the formation to enhance its transmissibility of oil and gas. Hydraulic fracture stimulation is required on the majority of wells in the MBPA to enhance productivity. All hydraulic fracturing activity would be in compliance with BLM and UDOGM hydraulic fracturing rules and notices.

Water/sand slurry would be used with gels and other non-toxic chemical additives to ensure the quality of the fracture fluid. Fluid would be pumped down the well through perforations in the casing and into the formation. Pumping pressures would be increased to the point at which fractures occur in the rock formations and radiate outward from the perforations into the target formation. The slurry that flows rapidly into the fractures and the sand in the slurry mix would serve as a proppant to keep the created fracture open after the fracture treatment, thereby allowing reservoir fluids to move more readily into the well. Water use during drilling and completion operations would vary in accordance with the characteristics of the formations the wells are completed in, but would average approximately 7,000 bbls (0.9 acre-feet) for a Green River oil well and up to 48,000 bbls (6.2 acre-feet) for a deep gas well.

Typical equipment and vehicles used during completion activities would include carbon dioxide (CO_2) tanker trucks; sand transport trucks; water trucks; oil service trucks used to transport pumps and equipment for fracs; flat beds and gin pole trucks to move water tanks, rigs, tubing, and frac chemicals; logging trucks (cased hole wireline trucks); and pickup trucks to haul personnel and miscellaneous materials and equipment.

Completion activities would take place on a 24-hour basis, requiring approximately 14 workers. Green River oil well completions would take an average of 6 to 7 days for vertical or directionally drilled Green River wells. Horizontal well completions would take up to 10 days to complete. Completion activities on the deep gas wells would require an average of 24 days, depending on the number of completion zones. If flaring is necessary during completion operations, flaring would take place as described in **Section 2.2.3**.

2.2.5 Interim Reclamation

For the complete reclamation and weed control plan for this project, refer to Appendix G. Interim reclamation consists of minimizing the footprint of disturbance by reclaiming all portions of well pads, ROWs, and other surface facilities not needed for production operations. The portions of the well site and other project facilities that are not needed for operational and safety purposes would be recontoured to a final or intermediate contour that blends with the surrounding topography as much as possible. Stockpiled topsoil would be re-spread over areas not needed for all-weather operations. When practical, topsoil would be re-spread over the entire location, roughened to enhance water catchment and revegetated to within a few feet of the production facilities; unless an all-weather surfaced access route or turnaround is needed.

Some locations would require special reclamation practices. Methods such as hydromulching, straw mat application on steeper slopes, fertilizing, and soil analysis to determine the need for fertilizer, seed-bed preparation, contour furrowing, watering, terracing, water barring, and the replacement of topsoil would be implemented as directed by the SMA. Interim reclamation surface disturbance associated with the proposed project and alternatives would be implemented in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a). These guidelines would apply to interim reclamation activities in the MBPA and include measurable standards as well as the monitoring and reporting of compliance with the reclamation standards. The Green River District has developed a web-based reclamation database entitled the "Green River Database Management System". This system allows operators or contractors to submit reclamation reports. Reclamation reports associated with this Project will be submitted via this database.

Prior to interim reclamation activities, all solid wastes and refuse would be removed and transported to an approved landfill. Upon completion of a producing well site, all reserve pits, cellars, rat holes, and other boreholes unnecessary for further well operations would be promptly backfilled. Reserve pit closure would be subject to COAs determined through the APD process. Any hydrocarbons in the reserve pit would be

removed and processed or disposed of at an appropriate offsite commercial facility. Cuttings generated during the drilling process would be buried in the reserve pit following the evaporation or removal of free liquids. The reserve pits would be drained and emptied of fluids within 90 days and closed within 6 months of well completion per the requirements of *Onshore Oil and Gas Orders No. 7*, subject to weather conditions. The pit liner would be folded into the reserve pit and the pit backfilled. Backfilling of each reserve pit would be done in such a manner that the mud and associated solids would be confined to each pit and not incorporated in the surface materials. The reserve pit and that portion of the location not needed for production facilities/operations would be recontoured to the approximate natural contours and crowned slightly to prevent water from standing. All of the topsoil would be spread over the recontoured area and then seeded to promote topsoil viability. All disturbed areas would be reclaimed with a seed mixture of pure live seed (PLS) accepted and approved by the AO.

2.2.6 Production, Operation, Hydraulic Fracturing, and Maintenance Activities

2.2.6.1 Production and Operations

Production facilities would be installed on the well pad when a well is determined to be commercially productive. Newfield may eventually employ the use of centralized tank batteries (CTBs) as multiple wells are brought into production within a given area. Each CTB would centralize the location of the production equipment for multiple wells, thereby reducing surface facilities on individual pads. As CTBs are constructed and become operational, daily well maintenance traffic would be reduced. The number and locations of potential CTBs would be highly dependent upon the surrounding topography and proximity to the wells contemplated for inclusion at the individual CTB. In some cases, a stand-alone tank would be necessary. For the purposes of analysis, it is assumed that all CTBs would be located on proposed GOSPs.

Permanent aboveground structures, including pumping units, would be painted a flat, non-reflective, earth-tone color on the BLM's Standard Environmental Color Chart, as determined by the AO. Facilities would be painted within 6 months of installation. As required by the Occupational Safety and Health Administration (OSHA), some equipment would not be painted for safety considerations (i.e., some parts of equipment would retain safety coloration).

2.2.6.1.1 Green River Oil Wells

Primary production equipment at the Green River oil wells would include the wellhead; a pumpjack driven by a natural gas fueled engine; a heater treater to separate oil, gas, and water; two 400-bbl oil/production tanks; and one 200-bbl produced water tank. Ancillary equipment on each of the well pads may include 150-gallon chemical storage drums, 55-gallon motor oil drums, and 55-gallon methanol storage drums.

As the GOSP system is phased in, Newfield would remove tanks and heater treaters from individual well pads that are served by a GOSP. The heater treaters would be replaced by a separator. As GOSPs are phased in, the well facilities would be reduced or eliminated, resulting in a decrease in pumper truck traffic. Maintenance activities would be re-directed to the GOSPs.

During daily operation of the Green River oil wells, produced oil and water from the wells may potentially be transported via surface pipeline to one of the existing or proposed GOSPs located within the MBPA. The oil and produced water would be separated at the GOSPs and routed to separate storage tanks. Oil would be sold directly from the GOSPs and transported to commercial points outside of the MBPA by tanker truck. Well site storage tanks, a VOC emissions source, and related tanker truck traffic would be eliminated at wells served by a GOSP.

Produced water from the Green River oil wells would be transported by pipeline to one of the proposed water treatment and injection facilities. Produced water not suitable for reinjection would be trucked to permitted salt water disposal (SWD) wells for disposal.

Crude oil produced from the Green River reservoir sands in the MBPA is known to be high in paraffin content, with a pour point of 95 degrees Fahrenheit (°F), below which the oil solidifies. Consequently, flowlines and production tanks would be equipped with a closed-loop trace system that circulates heated ethylene glycol solution (antifreeze) to maintain crude oil in a fluid state.

2.2.6.1.2 Deep Gas Wells

Production equipment at deep gas wells would include a wellhead; one 400-bbl condensate/production tank; one 400-bbl produced water tank; storage tanks for methanol and motor oil; a gas meter; and a combination unit 2.0-MMscf/d separator and dehydrator, with an integral boiler (estimated at 750 thousand British Thermal Units (MBtu)/hr). Ancillary equipment on each of the well pads may include 150-gallon chemical storage drums.

Gathered natural gas produced from the deep gas wells would be flared for up to 30 days after initial well evaluation tests. If flaring is to exceed 30 days, Newfield would request approval from the appropriate regulatory authority (i.e., UDOGM or EPA). Following testing and during daily operation of the gas wells, gas from an individual well would first be separated from associated condensate and water at the well pad and then piped to one of the proposed or existing compressor stations. Once the produced gas is compressed and dehydrated at the proposed compressor stations, it would be carried via pipeline to the central gas processing plant where it would be prepared for delivery to a sales pipeline. Condensate from the deep gas wells would be sold and transported to commercial points outside of the MBPA by tanker truck. Produced water from the deep gas wells would be transported by pipeline to one of the proposed water treatment and injection facilities, where it would be treated and used in the Green River secondary oil recovery waterflood program or trucked to a SWD well for disposal.

2.2.6.1.3 Conversion of 40-acre Spaced Green River Oil Wells to Injection Wells

Waterflooding consists of pumping water into various isolated Green River Formation oil reservoirs to re-pressurize and displace the oil more efficiently than primary depletion alone. Newfield would use waterflooding technology on the majority (i.e., approximately 60-70 percent) of the proposed 40-acre surface and downhole spaced Green River wells after initial production. Oil well conversion to injection wells would occur after approximately 3 years of production.

During oil well conversion, oil production equipment (anchor, sucker rods, pump jacks, well head valves, flow lines, treater, water tank, and oil tanks) would be removed from the well pad. A packer would be installed on the end of the tubing and set no more than 100 feet above the top perforation. Pressure monitoring gauges would be installed on the wellhead and casing annulus to monitor the pressure at which water is injected and the casing pressure, respectively.

Water injection lines would be installed from the main pipeline to the individual wells to provide water. Injection wells would be equipped with flow meters and choke valves to regulate injected water volumes. After all water injection lines are installed, produced water would be injected into the oil-bearing formation.

2.2.6.2 Maintenance

Routine inspection and maintenance of project facilities within the MBPA would occur on a year-round basis or as ground and site conditions permit. New wells would typically be visited daily by a maintenance worker and 3 to 4 water trucks for approximately 2 to 3 weeks after completion, based on well performance.

When operationally feasible, meters at all producing wells would be equipped with remote telemetry monitoring systems. The system would monitor gas and water production rates, pipeline pressure, and separator pressure to determine if abnormal conditions exist. Control and monitoring of well production by remote telemetry would reduce the number of pumper visits based on well performance.

Project roads would be maintained to provide year-round access. Maintenance would correct excessive soil movement, rutting, holes, replacement of surfacing materials, clearing of sediment blocking ditches and culverts, and/or damage to cattle guards, gates, or fences. Should snow removal be necessary, roads would be cleared with a scraper and snow would be stored along the down gradient side to prevent runoff onto the road.

Road maintenance agreements and requirements would vary in the MBPA, based on the owner of the road. Under existing agreements between the BLM and the counties, Duchesne and Uintah Counties maintain segments of BLM roads in the MBPA. Counties would continue to maintain existing county roads. Newfield would be required to maintain access roads to the standards specified in their use authorization, and in accordance with BLM road standards established in the *Gold Book*. Dust control would be achieved by using water or other SMA-approved dust suppressants, such as magnesium carbonate.

2.2.6.2.1 Workovers and Recompletions

Each new well would likely require a workover during the first year of production. A workover rig is similar to a completion rig and performs a variety of maintenance procedures to keep the well operating efficiently. Workovers can include repairs to casing, tubing, rods, pumps, the wellhead, or the production formation itself (i.e., to increase or maintain production from downhole-producing zones or to re-complete a well in a new zone). These repairs generally occur during daylight hours and typically would require approximately 3 days. In some limited situations, workovers may require up to 10 days. In the case of a recompletion, where casings are worked on or valves and fittings would be replaced to stimulate production, all by-products would be stored in tanks and hauled from the location to an approved/permitted disposal site.

2.2.7 Final Reclamation and Abandonment

For the complete reclamation and weed control plan for this project, refer to Appendix G.

A typical well life span varies from 20 to 30 years. Prior to reclamation of any well pad, pipeline or road, Newfield would file a Notice of Intent (NOI) to abandon with the BLM that details the proposed procedures. The BLM would then attach the appropriate surface rehabilitation COAs for the well pad and for the associated access road, pipeline, and ancillary facilities as appropriate,. During plugging and abandonment, all other surface equipment, including tanks, pumping unit, three-phase separator, and aboveground flow lines, gas system pipelines, and water pipelines, would be removed from the site. Buried pipelines would be purged and left in place. Wellbores would be plugged with cement to prevent fluid or pressure migration and to protect mineral and water resources. Wellheads would be removed, both the surface casing and production casing would be cut off below ground level, and an appropriate dry hole marker would be set in

compliance with federal and State regulations and SMA direction. Backfilling, leveling, and recontouring would then be performed according to the appropriate SMA.

All abandoned roads, ROWs, compressor stations, GOSPs, and other surface facilities would be reclaimed to their original condition as near as practical and in compliance with the appropriate SMA. At the time of final abandonment, all surface equipment, including all surface pipelines, would be removed from the site. Cut and fill materials would be recontoured, and topsoil would be replaced on the surface above the former location to blend the site with its natural surroundings. These areas would then be seeded with an SMA-approved seed mixture. Follow-up survey and treatment of weeds and invasive plant species would be conducted until reclamation is deemed to be successful and/or complete.

On Federal lands, reclamation of surface disturbance associated with the proposed project and alternatives would follow the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a). Reclamation plans may be revised and finalized when a site-specific APD and/or ROW application is submitted to the BLM.

2.2.8 Water Requirements

The following section describes water needs for well drilling and completion, dust suppression, and waterflooding operations. Calculations in this document are based on a 42-gallon barrel.

During the early phases of the project, water would be used for drilling and completion purposes and obtained from existing permitted water supply sources (see **Table 2.2.8-1**). These sources would consist of both ground water from wells, surface withdrawals, and from Newfield's proposed water collector well along the Green River. Withdrawals would be made from suppliers that hold existing water rights permits through the Utah Division of Water Rights. During the latter portions of the Project, the majority of project water needed would come from recycled produced water. Water volumes required for drilling, completion, dust suppression, and waterflooding would depend on the alternative selected.

2.2.8.1 Drilling and Completion

Typically, 7,000-bbls (0.9 acre-feet) of water would be required to drill and complete a Green River well, and approximately 48,000-bbls (6.2 acre-feet) of water would be required to drill and complete a deep gas well. Water used during drilling and completion would be piped to water treatment and injection facilities. The total water use for drilling and completion of all wells could be up to 18,425 acre-feet.

2.2.8.2 Dust Suppression

Water used for dust suppression would represent a small percentage of the total water needs for the proposed project. Dust abatement would be implemented using standard water trucks that hold approximately 130 bbls of water (0.016 acre-feet).

For purposes of analysis, approximately five water trucks (approximately 650 bbls or 0.08 acre-feet) would be needed for dust suppression per new well pad, access road, and pipeline corridor during construction activities for approximately 10 percent of the proposed project (e.g., up to 575 new well pads and their associated roads, pipeline corridors, and other surface facilities under the Proposed Action or Alternative C). Based on these assumptions, and depending on the alternative selected, Newfield could use up to an estimated 46 acre-feet of water for dust suppression during construction activities.

In addition, approximately 1,000 bbls (0.13 acre-feet) of water would be needed annually for dust suppression per well pad, associated access road, and pipeline corridor during project operation. As mentioned above, this would represent approximately 10 percent of the total water needs for the proposed Project (e.g., up to 575 well pads and their associated roads, pipeline corridors, and other surface facilities under the Proposed Action and Alternative C). Based on these assumptions, Newfield could use up to an estimated 75 acre-feet of water per year for dust abatement during project operations, or up to 2,296 acre-feet of water for dust suppression over the construction and operational period.

2.2.8.3 Waterflooding Infrastructure and Operations

Depending on the alternative selected, Newfield could convert up to 1,144 of their proposed wells to injection wells that require approximately 11.44 acre-feet of fresh water per day. Annual water requirements for waterflood operations could be up to 4,176 acre-feet per year, or about 140,010 acre-feet over the construction and operational period.

Approximately half of the water for flooding operations could come from produced water that would be treated for injection, and the other half could be obtained from freshwater sources identified in **Table 2.2.8-1**. Fresh water for waterflooding and infrastructure and operations would come from sources identified in **Table 2.2.8-1** and Newfield's proposed water collector well**.**

2.2.8.3.1 Water Collection Station

Up to approximately 1 acre of temporary surface disturbance would occur within the floodplain for construction of the water source well. The water source well would extend to a depth of approximately 100 feet below the surface and would be developed using conventional drilling methods. An example diagram of a water source well (i.e., depicting one well with five laterals) and the associated water processing station from Newfield's existing water collection station in the SE1/4 of Section 22 and NE ¼ of Section 27, T9N:R19E is included in **Figure 2.2.8.3-1 – Attachment 1**. Water quality and quantity would be measured at the proposed water collection station both prior to construction and drilling and within three months following operation. Results would be provided to the BLM, EPA, Utah Division of Oil Gas and Mining (UDOGM), the Utah Division of Water Quality (UDWQ) Groundwater Protection Section, and the UDWQ Watershed Management Section, and the Operator.

Each lateral would require a temporary pad approximately 100 feet by 100 feet in size (0.2 acre) to drill the hole and to install the pump. Following successful reclamation, surface disturbance within the floodplain would be limited to the maintenance hole cover on each well and the area immediately surrounding the manhole. The water source well would be equipped with steel casing between 10 to 14 inches in diameter. This casing would include sections of stainless steel screening that would allow groundwater to move from the surrounding alluvial aquifer into the wellbore. The screen opening typically would be no larger than 0.1 inch. The well casing would terminate 1 foot below the ground surface. The top of the casing would be capped with a bolt-down lid. A manhole structure and manhole lid also may be placed around the well casing with the lid flush to the ground surface. The area adjacent to and surrounding the manhole would be graded to the top of the manhole and seeded with a native, site-specific seed mix to blend with the surrounding areas.

TABLE 2.2.8-1
EXISTING WATER SUPPLY SOURCES FOR THE MONUMENT BUTTE PROJECT

Base Water Right	Segregated Water Right	Supplemental Group Number	Change Number	Filing Date	Source	Location	Annual volume (acre/ft.)	Use	Depletion
43-7478	None	217235	a11187	4/29/74	Underground Water Well	N 500 ft. W 110 ft. from SE cor, Sec 30, T2S, R2W; N 2,407 ft. W 200 ft. from SE cor Sec 30, T2S, R2W	225.0	Municipal	Historic
47-1358	None	None	t37916	6/26/63	Tributary to Pleasant Valley Wash	N 1,410 ft. E 1,450 ft. from W4 cor Sec 7, T4S R1W	99.0	Industrial: O&G Drilling	Historic
41-3530	47-1817	621892	a31022	2/6/06	Duchesne County Water Conservation District	S 1,087 ft. E 1020 ft. from N4 cor, Sec 15 T2N, R22E	690.0	Industrial: O&G Recovery	New
41-3530	47-1821	None	a31022a	10/29/09	Duchesne County Water Conservation District	S 413 ft. E 1225 ft. from N4 cor, Sec 27, T9S, R19E	2,210.0	Industrial: O&G Recovery	New
47-1802	None	225664	a34586	4/23/94	Green River Collector Well	S 413 ft. E 1225 ft. from N4 cor, Sec 27, T9S, R19E	941.1	Industrial: O&G Recovery	New
47-1804	None	225666	a34585	12/4/95	Green River Collector Well	S 413 ft. E 1225 ft. from N4 cor, Sec 27, T9S, R19E	941.1	Industrial: O&G Recovery	New
Total	--	--	--	--	--	--	**5,106.2**	--	--

The water source well would contain a submersible pump, motor, and electric cable. The pump and motor would be sealed in casing to prevent potential leaks of petroleum products (i.e., lube oil). The pump would be connected to a 6- to 8-inch outer diameter pipe, known as a carrier pipe, which would convey the pumped water from the water source well to the water processing station on the same side of the Green River. This carrier piping would be buried 5 feet bgs to prevent freezing and to avoid long-term surface disturbance within the floodplain. Installation of the water source well would occur during the low-flow season of the Green River (fall/winter).

The water processing station would require an area of 200 feet by 150 feet (0.7 acre) of surface disturbance, located adjacent to but outside of the Green River 100-year floodplain. Power for the water processing station would be provided by a 300- to 600-hp generator that would be located within a building. Onsite power generation would utilize either produced natural gas or NGL as a fuel source to power the generator associated with the processing station. The generator would power the fresh water well pump and booster pump that would transport the water to each of the injection wells. The water processing station would include a hydrocyclone system to remove solids from the waterflood system for injection. A hydrocyclone is a stationary device that uses centrifugal force to separate solids such as fine sand from the water. This system would precipitate solids from the water and would have a combined capacity of 20,000 bbls per day (bpd). The water processing station would likely be located on private land, and therefore would be subject to landowner negotiations and site-specific conditions. Therefore, a conceptual location for the water collector station is not identified in this EIS.

The water processing station would include a 40-foot by 40-foot parking lot and a building approximately 30 feet long by 25 feet wide with walls approximately 10 feet high. The parking lot would be graded and graveled. The building would be constructed of either cinder block or metal siding finished in an earth tone. The roof on the building would be pitched, of metal construction, and would be finished in an earth tone. If noise attenuation of the generator does not reduce noise to 45 decibels (dB), critical-grade mufflers would be installed to further reduce noise levels. Tree and shrub species recommended by the surface owner would be planted along the sides of the building facing the Green River to minimize the visibility of the building from the Green River. In addition, Newfield would develop a landscaping plan describing plant spacing and irrigation and maintenance requirements.

Water from the fresh water collection areas would be either pumped into a wet well (cistern) located beneath the building or piped directly to the booster pumps for distribution via buried pipelines to the well field. Some excess water may occur during initial flow back immediately after drilling the well. All water is groundwater and no chemicals filtering or treatment of the water occurs. The volume of water is small and this occurs infrequently. Once connected, 100% of the water produced by the well is contained within infrastructure, and no discharges occur.

A network of buried, high pressure water pipelines would supply both fresh water and treated water from the central water processing station to the injection wells. These water pipelines would be buried approximately 4 to 5 feet deep within the same ROWs proposed for roads and other pipelines. Approximately 8 miles of 6-inch steel trunk lines and 4 miles of 3-inch steel lateral lines would be constructed to transport water from the central water processing facility to the injection wells. The injection wells would be equipped with flow meters and choke valves to regulate injected water volumes. Water pipelines would be from 4 to 8 inches in diameter and would be constructed from steel and/or polypropylene. These water pipelines would be buried to prevent freezing and would be installed in conjunction with (alongside) the high-pressure gas gathering pipelines, where possible.

2.2.8.4 Water Depletion and Previous USFWS Consultations

Newfield currently has secured water rights for up to 5,106 acre-feet per year from the water supply sources identified in **Table 2.2.8-1**. Water from these sources will be used for drilling, completion, dust suppression, and waterflood operations. Of this volume for existing water rights, 324 acre-feet are from water sources considered historic depletions under the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (USFWS 1987). Section 7 consultation was completed for all historic depletions in 1993 (USFWS 1993). As part of this consultation, it was determined that historic depletions, regardless of size, do not pay a depletion fee to the Recovery Program.

In addition, three consultations have been completed for water depletions associated with oil and gas development projects in the MBPA. Currently, a total annual volume of 3,328 acre-feet has been authorized through these consultations (see **Table 2.2.8.4-1**). Water used under these previous consultations, plus the historic water rights, makes a total of 3,652 acre-feet of water available for this project that have gone through the Section 7 consultation process. Any additional water needed for the proposed project (e.g., water from (WR 41-3530; WR 47-1802; WR 47-1804 and the proposed water collector well) would require additional consultation.

TABLE 2.2.8.4-1
PREVIOUS USFWS CONSULTATIONS FOR WATER USAGE IN THE MBPA

Project	Biological Opinion	Date	Consulted Water Volume	Depletion Payment
Final Formal Section 7 Consultation for Castle Peak Eightmile Flat Oil and Gas Expansion Project	6-UT-05-012 05-0600	7/6/05	2,081 acre-feet	$33,920.30
Amendment to Formal Section 7 Consultation for Castle Peak Eightmile Flat Oil and Gas Expansion Project Re: 6-UT-F-05-F012	FWS/R6	4/11/06	819 acre-feet	$13,652.73
Final Biological Opinion for Newfield's 20-acre Infill Development Project	06E23000-2012-F-0024 6-UT-12-F-002	1/20/12	428 acre-feet	$8,221.88
Total	--	--	**3,328 acre-feet**	**$55,794.91**

2.2.9 Produced Water Disposal

Produced water from newly completed wells may be temporarily disposed of within lined reserve pits or storage tanks for a period not to exceed 360 days after initial production on State or private land (per UDOGM regulations), and 90 days on BLM-administered lands (per *Onshore Oil and Gas Order No. 7*). On BLM-administered lands, pits may be reused if additional wells are drilled from the same well pad within a one-year time frame.

Additional produced water disposal wells would likely be drilled in the MBPA on existing well pads, or existing wellbores would be converted from deep gas production to disposal operations to minimize additional surface disturbance. The number of produced water disposal wells would depend upon the ability

to obtain the necessary permits through the appropriate permitting authority and the number of additional wells drilled under a given alternative. Injection into disposal wells is Newfield's preferred method of produced water disposal.

Underground injection wells used in conjunction with oil and gas production are referred to as Class II wells under the EPA Underground Injection Control (UIC) program. Class II wells can be used either for pressure maintenance to increase the efficiency of the recovery of oil and gas, or can be used for the disposal of liquid waste generated by oil and gas production operations that meets the definition of exploration and production waste exempt under the Resource Conservation and Recovery Act (RCRA), Subpart D (mainly produced water). In December of 2012, Newfield received an approved UIC Area Permit from the EPA for the MBPA (Area UIC Permit No. UT22197-0000). Within the MBPA, Newfield currently operates 517 UIC wells under UDOGM jurisdiction, and 538 UIC wells under EPA jurisdiction, all of which support their secondary recovery program. Newfield operates one SWD well in the MBPA (i.e., the GMBU Pariette 4-7-9-19).

Permitting of Class II wells is regulated in Utah by UDOGM and by the EPA for Indian trust lands[3]. The permit process requires agency review of the application and a 15- to 30-day public comment period upon publication of notice of a draft permit. If there are no protests or objections to a pending application, it would be approved administratively.

Up to three water treatment and injection facilities would be constructed. The proposed water treatment facilities would be used for recycling of produced water that either would be co-mingled with fresh water and piped for waterflood injection wells or trucked from the facility to be used at subsequent wells for completion activities. Conceptual locations for water treatment and injection facilities have been illustrated on each alternative map (see **Figures 2-1** through **2-4 – Attachment 1).**

2.2.10 Hazardous Materials and Solid Waste

A variety of chemicals, including lubricants, paints, and additives, are used to drill, complete, and operate a well. Some of these substances may contain constituents that are hazardous. Hazardous materials can include some greases or lubricants, solvents, acids, paint, and herbicides, among others. These materials would not be stored at well locations, although they may be kept in limited quantities on drilling sites and at production facilities for short periods of time.

None of the chemicals that would be used during drilling, completion, or production operations meet the criteria for being an acutely hazardous material/substance or meet the quantities criteria per the BLM *Instruction Memorandum No. 93-344*. Most wastes that would be generated at project locations are excluded from regulation by the RCRA under the exploration and production exemption in Subtitle C (40 CFR 261.4[b][5]) and are considered to be solid wastes. These wastes include those generated at the wellhead, through the production stream, and through the inlet of the gas plant. Exempt wastes include produced water, production fluids such as drilling mud or well stimulation flowback, and crude oil impacted soils.

Any spills of oil, gas, salt water, or other such fluids would be cleaned up and removed to an approved disposal site. Spills of at least 10 barrels in non-sensitive areas would be reported to the AO in a written

[3] The State of Utah has primacy for the UIC program outside of Indian Country. The US EPA retains primacy for UIC in Indian Country under the Safe Drinking Water Act. In the MBPA, the EPA Region 8 office administers Range 17E–19E.

report and to other appropriate authorities. Major undesirable events of 100 barrels or more must be reported to the AO within a maximum of 24 hours; however, if the spill is entirely contained within the facility firewall, it may be reported only in writing pursuant to Section III of NTL-3A. Any spill which occurs in a sensitive area, regardless of the volume involved, must be reported within 24 hours to the AO.

Drilling and production operations would require preparation of a Spill Prevention Containment and Control (SPCC) plan that outlines the methodology to be used in the event of a spill. The SPCC plan describes spill control, reporting, and cleanup procedures to prevent impacts to surface and subsurface waters. A copy of the drilling company's SPCC plan would be kept on site during drilling operations. All produced liquid hydrocarbons would be stored in tanks surrounded by a secondary containment berm of sufficient capacity to contain the entire capacity of the largest single container with sufficient freeboard for precipitation. All loading lines and valves would be placed inside the berm surrounding the tank or would use catchment basins to contain spills. The tanks would be emptied as necessary to prevent overflow, and the liquids transported to market via trucks and/or pipelines.

Portable toilets and trash containers would be located on active construction sites throughout the MBPA. A commercial supplier would install and maintain portable toilets and equipment and would be responsible for removing sanitary waste. Sanitary waste facilities (i.e., toilet holding tanks) would be regularly pumped and their contents disposed of at approved sewage disposal facilities in Carbon, Duchesne, and/or Uintah Counties, in accordance with applicable rules and regulations regarding sewage treatment and disposal.

Accumulated trash and nonflammable waste materials would be hauled to an approved landfill once a week or as often as necessary. All debris and waste materials not contained in the trash containers would be cleaned up, removed from the construction ROW or well pad, and disposed of at an approved landfill. Sanitary waste equipment and trash bins would be removed from the MBPA upon completion of the construction of well pads, access roads, and other surface facilities, and following drilling and completion operations at well pads.

2.2.11 Adaptive Management Strategy for Potential Adverse Ozone Formation

Ozone concentrations in the Uinta Basin have been found to be exceeding National Ambient Air Quality Standards (NAAQS) during periodic winter inversion events. A comprehensive understanding of the chemical pathways, analytical methodologies, and demonstrable control technologies and methods has been lacking to allow for a scientifically based examination of this issue in recent NEPA documents relating to oil and gas production in the Uinta Basin. To address the uncertainty relating to this, BLM has been including adaptive management requirements in both recent and current NEPA documents relating to significant oil and gas development in the Basin. One of the components of these adaptive management prescriptions is the commitment to apply enhanced mitigation for ozone when an exceedance of the ozone NAAQS has been measured and recognized based on criteria in the Clean Air Act that defines how NAAQS determinations are made (40 CFR Part 50). Based on recent studies, BLM believes this adaptive management requirement for enhanced mitigation has been triggered, and that tentative control determinations can be made at this time as an initial start in controlling and preventing winter ozone formation. The control measures identified in Section 2.2.14 reflect the best available air pollution control technology as applied to oil and gas exploration and development, and in some cases are more restrictive and achieve a greater level of control than required under current Clean Air Act and State of Utah regulations, and include significant reductions in existing emissions.

Over the past 3 years, significant research had been conducted in the Uinta Basin to further the understanding of winter ozone formation (USU EDL 2011). Current studies indicate that high levels of

VOC are found throughout the Uinta Basin, which may be significantly contributing to high winter ozone episodes. The winter ozone study is still ongoing. BLM, in consultation with the Utah Department of Environmental Quality - Division of Air Quality (UDEQ-DAQ) and the EPA, is currently in the process of developing a list of enhanced seasonal pollution control measures and work practices specifically aimed at reducing the emissions of VOCs which form winter ozone. These control measures and work practices will be required for all operations approved under this NEPA action.

It is recognized in this adaptive management prescription that additional research and analysis needs to be conducted in the Uinta Basin to more fully understand the mechanics of winter ozone formation, and that specific control and work practice recommendations may change over time. To address the continued scientific uncertainty on this issue, BLM will continue to include an adaptive management requirement in NEPA documents for oil and gas developments in the Uinta Basin. Once a basin-wide control plan is developed and approved by UDEQ-DAQ and/or EPA, BLM will review these control measures and may add, delete, or otherwise modify these requirements to conform to the requirements or recommendations of a regulatory basin-wide management plan. These adaptive management modifications will be applicable to this NEPA action. These adaptive management requirements have evolved from the Draft EIS to the Final EIS in part because of the completion of the project specific ARMS modeling as well as comments received during the comment period.

2.2.12 Applicant-Committed Environmental Protection Measures (ACEPMs)

Under the action alternatives, Newfield has committed to the following measures to reduce the potential environmental impacts of the proposed oil and natural gas development and waterflooding operations within the MBPA. The following ACEPMs would apply to all Federal lands within the MBPA.

2.2.12.1 Air Quality

2.2.12.1.1 General

- Newfield would use water or other BLM-approved dust suppressants as needed during drilling, completion, and high traffic production operations for dust abatement.
- Newfield employees would comply with posted speed limits on unpaved county roads used for access and would use safe vehicle speeds on other unpaved access roads. Newfield would instruct contractors to comply with posted speed limits.
- The use of carpooling would be encouraged to minimize vehicle traffic and related emissions and Newfield would implement a vehicle policy to minimize idling while also recognizing safety concerns.
- Newfield would conduct a pilot test to evaluate the feasibility for converting fleet vehicles to cleaner-burning compressed natural gas (CNG) or liquefied natural gas (LNG) fuels. The results of this pilot test would be submitted to the AO.

2.2.12.1.2 Drilling / Completion Operations

- Newfield would use Tier II diesel drill rig engines or equivalent, with the phase-in of Tier IV engines or equivalent emission reduction technology by 2018.
- Newfield would employ reduced-emission completion practices, including: using the recovered gas as fuel for another useful purpose when feasible; routing all saleable quality gas to a flow line as soon as practicable; and safely maximizing resource recovery and minimizing potential VOC emissions from hydraulically fractured, high-pressure gas well flowback operations (not including

low-pressure oil wells). If high-pressure gas well flowback emissions cannot be routed to a flow line, they will be captured and routed to a completion combustion device, unless such device will result in a fire or explosion hazard.

2.2.12.1.3 Production Operations

- Newfield would utilize for new construction low- or intermittent-bleed pneumatic devices to minimize VOC emissions. High-bleed devices may be allowed for critical safety and/or process purposes.
- High-bleed pneumatic devices at existing Newfield facilities would be replaced/retrofitted with low- or intermittent-bleed devices when repair or replacement is warranted, and no later than 6 months after the ROD is signed. High-bleed devices may be allowed to remain in service for critical safety and/or process purposes.
- Newfield would employ for new construction glycol dehydrator still vent emission controls with a control efficiency of 95 percent or greater.
- Newfield would conduct a study to evaluate the feasibility for the implementation of "low emission" glycol dehydrators. The results of this study would be submitted to the AO.
    - Newfield would install emission controls with an efficiency of 95 percent on tanks that have been constructed, modified or re-constructed after August 23, 2011, with the potential to emit greater than 6 tons per year (tpy) VOC.
- Newfield would implement a telemetry monitoring system where feasible to provide for the effective management of production exceptions, while reducing the number of vehicle trips and miles traveled.

2.2.12.1.4 Central Facilities

- Newfield would install electric motor driven compression where feasible. Where electrification is not feasible, Newfield would utilize lean-burn natural gas fired compressor engines or equivalent rich-burn engines with catalysts. Lean-burn engines would be fitted with oxidation catalysts to minimize carbon monoxide and VOC emissions.
- Newfield would maximize the use of central compression, thereby reducing the need for smaller and less efficient (higher emission) well site compressor units.
- Newfield would periodically replace rod packing systems on reciprocating compressors and when feasible use dry seals on centrifugal compressors to minimize the loss of VOC.
- Newfield would employ for new construction glycol dehydrator still vent emission controls with a control efficiency of 95 percent or greater.
- Newfield would install for new construction emission controls with an efficiency of 95 percent or greater on stock tanks that have the potential to emit VOC greater than 6 tpy.

2.2.12.1.5 GOSP Implementation

- Where feasible, Newfield would implement Green River oil gathering systems and construct GOSPs. With GOSP implementation, the majority of the stock tanks, produced water tanks, and related tank heaters at affected existing well sites would be removed from service. New wells served by a GOSP would be constructed without tank batteries, thereby eliminating tank battery and related tanker truck emissions.
- The GOSP facilities would be specifically designed to minimize the emission of VOC. Storage tank emissions would be captured and reused within the facility process or sold as product. Vapors from truck loading operations would be controlled by 95 percent.

2.2.12.1.6 Monitoring Programs

Newfield will conduct Audio-Visual-Olfactory (AVO) leak inspections on all existing and new facilities within the Project Area on an annual basis and repair observed leaks. Newfield will utilize IR Camera observations in place of AVO inspections for at least 10% of facility inspections. If future regulations are implemented to address leak detection and repair requirements, the regulatory program will replace the voluntary inspection program.

- Newfield will develop, and submit for BLM approval, a corrective action plan for the Project Area that would include appropriate timeframes to complete necessary repairs that may be identified in the future through the Monitoring Program.
- Newfield will provide an annual report listing the facilities where leaks were observed, the date the leak was observed, the cause of the leak, and the date corrective actions were completed at such facilities.

2.2.12.1.7 Adaptive Management

Annual Emissions Balance Sheet

Newfield will ensure that new stationary sources authorized by the ROD will not result in net increases of volatile organic compounds (VOC) emissions. This will be accomplished by achieving reductions of VOC emissions from existing stationary sources prior to operating new sources, balanced on a calendar year annual basis. Newfield will document such reductions in VOC, as well as additions in VOC, from stationary sources in an Annual Emissions Balance Sheet that will have sufficient information for BLM to verify the Operator's actions.

The Project Area shall be defined as the area analyzed in the GMBU FEIS (this shall be the "geographic area" as referenced elsewhere in this document). Stationary sources include, but are not limited to, engines, heaters, glycol dehydrators, oil and produced water storage tanks, truck loading, pneumatic controls, pneumatic pumps, and fugitive leaks.

Newfield will develop and use the Initial Emissions Balance Sheet as follows:

1. The reporting tool for the Initial Emissions Balance Sheet will be the emissions inventory workbook created by UDAQ and EPA for the Uinta Basin 2014 inventory (2014 emissions inventory workbook), which provides facility-by-facility and source-by-source emissions detail.

2. Newfield will use the emissions quantification methods used in the 2014 emissions inventory workbook to calculate VOC emissions for the 2012 operating year. This calculation of VOC emissions for the 2012 operating year will serve as the initial inventory against which subsequent increases or decreases in VOC emissions will be calculated and documented.

3. Technical corrections and revised calculation methodologies may be applied to the 2014 emissions inventory workbook following consultation between UDAQ, EPA, BLM and Newfield.

For subsequent year Annual Emissions Balance Sheets, the above-referenced 2012 emissions inventory calculated by using the 2014 emissions inventory workbook shall continue to serve as the template from which further emissions reductions and additions are calculated and documented. A separate 2015 or 2016

inventory of VOC emissions, as appropriate based upon the timing for the issuance of the ROD, will subsequently be prepared for comparison with the calculations of VOC emissions for the 2012 operating year to determine the net change in VOC emissions and available VOC headroom for project activities that result in new sources of VOC emissions.

VOC emissions reductions including, but not limited to, actions taken in response to voluntary actions, the implementation of applicant committed environmental protection measures, natural production decline (defined in the Technical Support Document), existing or new regulations, and/or ozone attainment and maintenance plans can be used to create headroom for project activities that result in new sources of VOC emissions.

Annually, or upon request by Newfield, BLM will conduct an internal review and assessment and confer with Newfield to consider new state and federal regulatory requirements and evaluate if portions of this mitigation strategy are no longer necessary. Upon review and Newfield consultation, BLM may remove components of the mitigation strategy that are determined to be equivalent in effect or duplicative of state or federal regulatory requirements or otherwise create contradictory or overlapping requirements. The review will also evaluate the impact of new regulations upon project VOC emissions and the need to continue the annual emissions balance sheet requirement.

The implementation of General Conformity requirements following an ozone non-attainment designation shall be considered equivalent to the annual emissions balance sheet provisions of this strategy, and the annual emissions balance sheet requirements may be terminated at Newfield's option. Upon adoption of a nonattainment FIP/SIP/TIP (or comparable provisions if the area is classified as marginal), this mitigation strategy in its entirety shall be replaced by the FIP/SIP/TIP.

2.2.12.1.8 Cooperative Efforts and Outreach

- Newfield would encourage and lend technical support to scientific research efforts focused on improving the understanding of ozone formation chemistry within the Uinta Basin, emission inventory enhancements, source apportionment studies, ozone precursor transport studies, precursor sensitivity studies, and evaluations of cost effective control strategies.
- Newfield would incorporate ozone awareness and specific actions for reducing ozone precursor emissions into the current employee training program.

2.2.12.1.9 Ozone Training for Operations Personnel

Newfield will develop an Ozone Action Mitigation Plan which includes an operator training component as well as a list of Project activities that could be delayed or minimized during ozone episodes.

For the purposes of the Ozone Actions Mitigation Plan, an ozone episode would be any next day that the UDAQ air quality forecast is Unhealthy for Sensitive Groups (Code Orange – minimum ozone concentration of 0.071) or higher as published on the UDAQ website (current link is: http://air.utah.gov/forecast.php?id=v4).

Newfield will develop and submit for BLM approval an Ozone Action Mitigation Plan which includes the following components:

- Newfield will incorporate in its current employee training program ozone awareness and specific actions for reducing ozone precursor emissions.

- To the extent practical, Newfield will halt, defer and/or otherwise schedule activities that may contribute to ozone formation to periods outside of ozone episodes.

Operations personnel shall receive training prior to ozone season. Training programs shall cover the following:

  - Ozone – what it is and how it impacts air quality and human health.
  - Ozone formation ingredients – NOx, VOCs, and weather conditions.
  - Ozone attainment status in the Uinta Basin.
  - Review of applicable regulations.
  - What can be done to prevent and/or reduce emissions of ozone precursor gases – such as limiting driving, maintaining equipment, delaying optional activities (e.g. equipment and well blowdowns, well completions, etc.).
  - The importance of proper maintenance of tank hatches, vapor capture and combustor systems, and other equipment that reduces emissions.

2.2.12.1.10 Work Practices

Work Practices

- Newfield will remain fully compliant with applicable UDEQ-DAQ rules at all times, including permitting for new and existing sources, and specifically found in Utah Administrative Code Title R307 501 through 504.
- Newfield will comply with Utah Division of Air Quality (UDAQ) Rule 307-502 requiring effective December 1, 2015, all existing pneumatic controllers in Duchesne County or Uintah County meet the standards established for pneumatic controller affected facilities that are constructed, modified or reconstructed on or after October 15, 2013, as specified in 40 CFR 60, Subpart OOOO Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution to minimize VOC emissions. High-bleed devices may be allowed for critical safety and/or process purposes.
- When technically and/or economically feasible, Newfield will consider non-gas driven (no bleed) pneumatics and potential opportunities for power supply for such devices through renewable resources for both existing and new development.
- Newfield would comply with the applicable requirements of UDAQ Rule 307-401-8a as they apply to the installation of Best Available Control Technology (BACT) compliant emission controls on glycol dehydrator still vents which requires the degree of pollution control for emissions, to be at least best available control technology. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, best available control technology shall be at least as stringent as any Control Technique Guidance document that has been published by EPA that is applicable to the source. The control efficiency shall be at least 95 percent or greater.
- Newfield would comply with the applicable requirements of UDAQ Rule 307-401-8a as they apply to the installation of Best Available Control Technology (BACT) compliant emission controls on tanks which requires the degree of pollution control for emissions to be at least best available control technology. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, best available control technology shall be at least as stringent as any Control Technique Guidance document that has been published by EPA that is applicable to the source.

- When technically and/or economically feasible, Newfield would route salable gas from oil/water/gas separators to a gas gathering pipeline or otherwise control emissions via a vapor combustor or equivalent methodology.
- Wells that utilize plunger lift systems (or otherwise automated systems) shall be operated so as to minimize fugitive emission from well pressure fluctuation and liquid accumulation within the well.
- The GOSP facilities would be specifically designed to minimize the emission of VOC. Storage tank emissions would be captured and reused within the facility process or sold as product. Vapors from truck loading operations would be controlled through a vapor capture system utilizing Best Available Control Technology (BACT) compliant with UDAQ Rule 307-401-8(a) which requires the degree of pollution control for emissions to be at least best available control technology. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, best available control technology shall be at least as stringent as any Control Technique Guidance document that has been published by EPA that is applicable to the source.
- Evaporation Ponds
  - Newfield would not own or operate evaporation ponds for the storage or disposal of liquids.
- Dehydrators
  - Optimize dehydrator recirculation rates for the prevailing conditions
- Venting Blow Downs
  - Defer and/or minimize blow down of wells, pipelines, and pressure vessels during ozone events
- Pneumatic Pumps
  - Adjust and optimize pneumatic heat trace pump rates for the prevailing conditions
- General Episodic Practices
  - To the extent practical, defer and/or otherwise schedule activities that may contribute to ozone formation to periods outside of ozone events
- Limit Vehicle Idle Time
  - Limit vehicle idle time to the extent practical

2.2.12.2 Paleontological Resources

- Paleontological surveys would be conducted by an SMA-approved paleontologist prior to any surface disturbance on State and Federal surface.
- If fossils are encountered during the survey, the paleontologist would assess and document the discovery, and either collect the fossils or recommend the area be avoided so as not to destroy the resource.
- The AO of the SMA would determine the need for further monitoring of the area or mitigation of the site during ground-disturbing activities.
- If paleontological resources are encountered during excavation, construction would be suspended, and the AO of the SMA would be notified. Construction would not resume until the paleontological resources are assessed by the AO of the SMA, and appropriate mitigation measures are developed and implemented.

2.2.12.3 Soil Resources

- During project construction, surface disturbance and placement of gas and water lines would be limited to the approved location and access routes.
- No oil, lubricants, or toxic substances would be drained onto the ground surface.

- All areas used for soil storage would be stripped of topsoil before soil placement.
- Where directed by the appropriate SMA, Newfield would construct erosion control devices (e.g., riprap, bales, and heavy vegetation) at culvert outlets. All construction activities would be performed to retain natural water flows to the greatest extent possible.
- In areas with unstable soils where seeding alone may not adequately control erosion, grading would be used to minimize slopes and water bars would be installed on disturbed slopes.
- Erosion control efforts would be monitored by Newfield, and modifications would be made to control erosion if necessary,.
- Erosion protection and silt retention would be provided by the construction of silt catchment dams where needed and as feasible.

2.2.12.4 Water Resources, Including Floodplains

- Produced liquid and natural gas gathering pipelines that are buried across water courses would be buried in accordance with guidelines established in the *Gold Book* and *Hydraulic Considerations for Pipelines Crossing Stream Channels*, Technical Note 423, April 2007. Specific burial depths for natural gas and produced liquids pipelines that cross perennial, intermittent, and ephemeral stream channels within the MBPA would be determined during the onsite process.
- In accordance with 40 CFR 112.3, Newfield would prepare and maintain SPCC plans for active facilities. Newfield would inspect each facility subject to SPCC requirements on an annual basis to ensure appropriate spill prevention measures are maintained. A management review of the SPCC plans would be conducted every 5 years.
- Newfield employees would be trained annually in spill prevention and reporting requirements. Contractors would be required to promptly report all accidental releases to a Newfield Supervisor.
- Newfield would use closed-loop drilling techniques for all proposed wells located in sensitive areas, such as the 100-year floodplain of Pariette Draw, and in all U.S. Geological Survey (USGS) named drainages within 3 miles of the Green River. Additional locations where closed-loop drilling may be merited would be determined during the onsite process.
- Newly constructed gas and water lines would be pressure tested to evaluate structural soundness and reduce the potential for leaks.
- Springs will be delineated and marked on maps and on the ground before development.

2.2.12.5 Vegetation, Including Noxious and Invasive Species and Wetland/Riparian Areas and Threatened, Endangered, or BLM Special-status Plant Species

- As required by the Endangered Species Act (ESA) of 1973, as amended, no activities would be permitted that would jeopardize the continued existence of threatened or endangered plant species.
- As required by the Noxious Weed Act of 1974, as amended, and by Executive Order 13112-1999, noxious weeds would be controlled in the MBPA by Newfield on all disturbances associated with its existing well pads, road, and pipeline routes, as well as infestations that would occur as a result of the project.
- Removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g., using previously disturbed areas and existing easements where feasible, placing pipelines adjacent to roads, limiting well pad expansion, etc.).
- In an effort to ensure that project activities do not increase the existence of invasive or noxious weeds in the MBPA, Newfield would prepare a Weed Control Plan. Specific components of the plan would include:

- Conducting individual noxious weed inventories on a well-by-well basis prior to construction activities. The inventories would include examination of all proposed surface disturbance (i.e., roads, pipelines, and well pads) associated with each well. The results of these inventories would include Global Positioning System (GPS) locations indicating the type and size of each infestation. This data would be formulated into a report and submitted with the APD.
- Preparation of a Pesticide Use Proposal (PUP).
- Following the construction phase and drilling phase for each well, all disturbed surface would be monitored annually for the presence of noxious weeds. If monitoring shows the presence of noxious weeds, Newfield would be responsible for treating these areas. Noxious plant control measures (mechanical, cultural, chemical) would be conducted annually prior to seed set. Monitoring and treatment would be conducted annually until reclamation and weed eradication is deemed successful by the AO of the appropriate SMA.
- All herbicide chemical control will be in conformance with national and local guidance, including approved chemicals, rates, and appropriate BMPs.
- To prevent further spread of noxious weeds, all vehicles and equipment would be power washed at designated washing locations to remove seed and plant materials before entering the MBPA from outside of the Uinta Basin.
- Springs will be delineated and marked on maps and on the ground before development.

2.2.12.6 Livestock Grazing

- Newfield would repair or replace any fences, cattle guards, gates, drift fences, and natural barriers that are damaged as a result of the Proposed Action. Cattle guards or gates would be installed for livestock control on roads when fences are crossed, and these structures would be maintained by Newfield for the life of the road.

2.2.12.7 Fish and Wildlife Including Special Status Fish and Wildlife Species

- As required by *Onshore Oil and Gas Order No. 1,* Newfield would remove any visible accumulation of oil from the reserve pit immediately upon release of drilling rig to prevent exposure of migratory birds and other wildlife to petroleum products.
- To minimize wildlife mortality due to vehicle collisions, Newfield would advise project personnel regarding appropriate speed limits in the MBPA.
- Employees and contractors would be educated about anti-poaching laws.
- If wildlife law violations are discovered, the offending employee would be subject to disciplinary action by Newfield. All wildlife law violations would be reported to the UDWR.
- Annual raptor surveys within the MBPA would be conducted by a BLM-qualified biologist.
- To reduce potential stress from facility construction to antelope, Newfield would install two antelope guzzlers per year for five years within the MBPA. These new facilities would not be subject to setbacks.
- For any surface-disturbing activities proposed between January 1 and September 31, a BLM-approved biologist would survey proposed development sites for the presence of raptor nests. The survey area would be determined on a site-specific basis by the AO of the appropriate SMA. On BLM lands, if occupied/active raptor nests are found, construction would not occur during the nesting season for that species within the species-specific buffer described in "Best Management Practices for Raptors and Their Associated Habitats in Utah." As specified in the Raptor BMPs, modifications of these spatial and seasonal buffers for BLM-authorized actions would be permitted, so long as protection of nesting raptors was ensured (see Appendix A of the Vernal ROD and Approved RMP) (BLM 2008b). Fee and SITLA lands would be excluded from this measure.

2.2.12.8 Cultural Resources

- A Class III inventory would be conducted in all areas within Federal lands proposed for surface disturbance. These surveys would be conducted on a site-specific basis prior to the initiation of construction activities.
- Whenever feasible, prehistoric and historic sites documented during the Class III inventory as eligible for listing on the National Register of Historic Places (NRHP), as well as areas identified as having a high probability of subsurface materials, would be avoided by development. Specifically, well pad locations and access/gas and water line routes would be altered or rerouted as necessary to avoid impacting NRHP-eligible sites.
- If avoidance is not feasible or does not provide the required protection, adverse effects would be mitigated (e.g., data recovery through excavation).
- Newfield would inform their employees, contractors, and subcontractors about relevant Federal regulations intended to protect archaeological and cultural resources. All personnel would be informed that collecting artifacts is a violation of Federal law and that employees engaged in this activity would be subject to disciplinary action.
- If cultural resources are uncovered during surface-disturbing activities, Newfield would suspend operations at the site and immediately contact the appropriate AO, who would arrange for a determination of eligibility in consultation with the Utah State Historic Preservation Office (SHPO) and if necessary, would recommend a recovery or avoidance plan.

2.2.12.9 Visual Resources

- To reduce visual impacts to recreationists using the Green River, low-profile tanks would be used at all well pads located within 0.5 mile or within line of sight (whichever is less) of the Green River.

2.2.12.10 Health and Safety/Hazardous Materials

- Newfield would institute a Hazard Communication Program (HCP) for its employees and require the subcontractor to operate in accordance with Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1200).
- required by OSHA, Newfield would place warning signs near hazardous areas and along access roads.
- In accordance with 29 CFR 1910.1200, a Material Safety Data Sheet (MSDS) for every chemical or hazardous material brought on-site would be kept on file in Newfield's field office.
- Newfield would transport and/or dispose of any hazardous wastes, as defined by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, in accordance with all applicable Federal, State, and local regulations.
- All storage tanks that contain produced water, or other fluids which may constitute a hazard to public health or safety, would be surrounded by a secondary means of containment for the entire contents of the tank plus freeboard for precipitation, or 110 percent of the capacity of the largest tank. Production facilities that have the potential to leak produced water, or other fluids which may constitute a hazard to public health or safety, would be placed within an appropriate containment and/or diversionary structure to prevent spilled or leaking fluid from reaching groundwater or surface waters.
- Notice of any reportable spill or leakage, as defined in BLM NTL 3A, would be reported by Newfield to the AO of the appropriate SMA as required by law. Oral notice would be given as soon as possible, but within no more than 24 hours, and those oral notices would be confirmed in writing within 72 hours of any such occurrence.

- Newfield would provide portable sanitation facilities at drill sites, would place trash cages at each construction site to collect and store garbage and refuse, and would ensure that all garbage and refuse is transported to a State-approved sanitary landfill for disposal.

2.2.13 Regional Mitigation

In accordance with BLM Washington Office Instruction Memorandum 2014-142 and the Draft Regional Mitigation Manual MS-1794, the BLM may require mitigation measures and conservation actions in order to achieve this EIS's purpose and need, or to meet land use plan goals and objectives, and provide for sustained yield of natural resources on Public Lands while continuing to honor the agency's multiple-use missions. The sequence of the implementation of the ACEPM and additional mitigation action will be the mitigation hierarchy, as identified by the White House Council on Environmental Quality (CEQ) (40 CFR 1508.20), Secretarial Order 3330, and the BLM Draft - Regional Mitigation Manual Section (MS)-1794. The mitigation hierarchy includes:

- Avoiding
  - Identification of avoidance areas and/or measures (e.g. timing limitations or no surface occupancy areas) already included in laws, regulations, and/or governmental decision documents (e.g. RMPs) that govern permit authorizations.
  - Identification of additional avoidance measures for the BLM to consider (e.g. additional avoidance best management practices).
  - For a few examples in this project, refer to the ACEPM Section 2.2.12.8 Cultural Resources 2nd bullet (avoidance of sites), Alternative D (the agency's preferred alternative) Section 2.6.1.1 100 Year Floodplains and Riparian Areas 1st bullet (avoidance of riparian areas), and Alternative D Section 2.6.2.1 Level 1 Core Conservation Areas 2nd bullet (avoidance of new disturbance).
- Minimizing
  - Identification of minimization measures (e.g. surface use controls, conservation measures, best management practices) already included in BLM decision documents (e.g. RMPs; USFWS Biological Opinions);
  - Identification of additional minimization measures for the BLM to consider (e.g. applicant-committed design features) or other site-specific BLM identified best management practices.
  - For a few examples in this project, refer to the ACEPM Section 2.2.12.9 Visual Resources (low profile tanks near the river), Alternative D Section 2.6.1.1 100-Year Floodplains and Riparian Areas 4th bullet (minimize new roads and pipelines in floodplains), and Alternative D Section 2.6.1.2 Special Status Species (300-feet avoidance).
- Rectifying
  - Identification of measures for the BLM to consider including repairing, rehabilitating, or restoring affected landscapes.
  - For a few examples in this project, refer to the ACEPM Section 2.2.12.6 Livestock Grazing (repairing damaged range facilities), ACEPM Sections 2.2.5 Interim Reclamation and 2.2.7 Final Reclamation and Abandonment, Alternative D Section 2.6.1.2 Special Status (weed control in cactus habitat), and Alternative D Section 2.6.3 New Development Based on Existing Well Density 5th paragraph (reclamation of existing well pads back to one acre).
- Reducing or Eliminating
  - Identification of measures for the BLM to consider to reduce or eliminate the impact over time (e.g. interim reclamation best management practices; adaptive management mitigation) by preservation and maintenance operations during the life of the action.

- For a few examples in this project, refer to Section 2.2.11 Adaptive Management Strategy for Potential Adverse Ozone Formation, the ACEPM Section 2.2.12.1.5 GOSP Implementation (reducing or eliminating truck traffic by central facility installation), and Alternative D Section 2.6.1.2 Special Status Species (dust abatement in cactus habitat).

- Compensating
  - Identification of measures for the BLM to consider to compensate for the impact by replacing or providing substitute resources or environments (e.g. contribution to monitoring fund; implementing best available technology to reduce emissions from existing wells to offset new wells).
  - For a few examples in this project, refer to ACEPM 2.2.12.1.8 Cooperative Efforts and Outreach (contributing data and technical support to ozone efforts), ACEPM 2.2.12.7 Fish and Wildlife Including Special Status Fish and Wildlife (building antelope guzzlers), and Alternative D Sections 2.6.1.2 Special Status Species and 2.6.2.2 Level 2 Core Conservation Area (mitigation fund contribution).

The priority is to mitigate impacts at the site of the activity in conformance with the purpose and need and land use plan goals and objectives, through impact avoidance, minimization, rectification, and reduction over time of the impact, including those measures described in laws, regulations, policies, and the land use plans. Compensatory mitigation will be implemented as necessary when the other types of mitigation measures are not sufficient to meet the purpose and need or land use plan objectives, or to ameliorate anticipated direct, indirect and cumulative impacts where substantial or significant residual impacts remain.

When applying mitigation at any level of the mitigation hierarchy, there will be requirements for monitoring the effectiveness of the mitigation as well as the durability of the mitigation (to be durable, the mitigation should meet or exceed the length of time that projected impacts would affect resources). This monitoring is necessary, especially in relation to durability for compensatory mitigation, in order to identify when it may be appropriate to consider applying adaptive management concepts to ensure continued effectiveness for the life of the project. For an example in this project, refer to **Section 2.2.11** Adaptive Management Strategy for Potential Ozone Formation.

Two important concepts related to durability are: 1) Ecological Durability - the length of time the benefits from mitigation measures persist on and influence the landscape and; 2) Protective Durability – the ecological values benefited in compensatory mitigation areas are protected from or unaffected by future conflicting land-uses or disturbances.

The ecological durability of compensatory mitigation is greatest if the areas where it is applied are large enough or strategically located so that they will, either in themselves or in conjunction with other adjacent landscape conditions or climate change predictions, provide the targeted conservation benefits. Ecological durability may be compromised when the benefits of compensatory mitigation do not persist for the full duration of the impact that is intended to be offset (e.g. from initial surface disturbance to final reclamation, rehabilitation or restoration). Damage to functioning compensatory mitigation measures may be caused by natural disturbances (such as wildfire) or anthropogenic disturbances (such as other authorized development), which shorten the intended duration of applicable mitigation.

The BLM will require that mitigation measures have a degree of protective durability. On public land, protective durability is best achieved by legal conservation designations, land use plan designations, and land use allocations, each of which offers a greater or lesser degree of protective durability. Financial protections (e.g., bonding for construction, endowment for mitigation management) are also important tools to achieve protective durability at the project implementation level. The BLM will expressly condition its

approval of a project on public lands on the applicant's commitment to perform or cover the costs of mitigation, whether onsite or outside the area of impact.

2.3 ALTERNATIVE A – PROPOSED ACTION

The Proposed Action includes the following primary components (see **Figure 2-1 – Attachment 1**):

- Development of approximately 750 Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing that would be drilled from new 2-acre well pads, all of which would be converted into waterflood injection wells after approximately 3 years of production;
- Development of approximately 2,500 Green River oil wells on 20-acre downhole spacing that would be directionally drilled from existing or the above described new well pads, consistent with current State spacing requirements;
- Development of approximately 2,500 new deep gas well pads and vertical wells on 40-acre surface density and downhole spacing that would be drilled from new 3-acre well pads, which would be constructed adjacent to Green River oil well pads to reduce new surface disturbance and to use existing utility infrastructure and access roads;
- Construction of approximately 243 miles of new 100-foot wide ROW that would be used for new road construction (40-foot width) and pipeline installation (60-foot width). Up to 70-foot-wide expansion along approximately 363 miles of existing access road ROW that would be used for road upgrade (10-foot width) and pipeline installation (60-foot width);
- Construction of 20 new compressor stations for deep gas well development;
- Expansion of three existing Green River oil well compressor stations and construction of one new compressor station for gas associated with Green River oil well development;
- Construction of a 50 MMscf/d centralized gas processing plant;
- Construction of seven new water treatment and injection facilities, and expansion of six existing facilities, for management and distribution and injection of produced water;
- Construction of up to 12 GOSPs for oil and produced water collection;
- Development of one fresh water collector well for waterflood operations; and
- Construction of six water pump stations.

Figure 2.3-1 – Attachment 1 shows active, inactive, and future UDOGM wells that occur within the MBPA boundary, including well status and well counts. Newfield currently operates approximately 3,395 oil and gas wells in the MBPA and proposes to drill associated wells at an average rate of 360 wells per year until the resource base is fully developed. Under this drilling scenario, construction, drilling, and completion of up to 5,750 wells would occur for approximately 16 years. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated life of project (LOP) under the Proposed Action would be from 41 to 51 years.

Surface disturbance anticipated under the Proposed Action is shown in **Table 2.3-1**. Initial surface disturbance would occur during and immediately after the construction, drilling, completion, and testing activities. Prior to interim reclamation, initial surface disturbance for well pads, access roads, pipeline ROWs, and other surface facilities would equal approximately 16,129 acres. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within two to three growing seasons, assuming optimal conditions are present. The remaining

surface disturbance would be residual or "long-term" disturbance of approximately 7,808 acres for the 41- to 51-year LOP.

Specific details of construction-related activities and specific design features for well drilling and completion; production, operations, and maintenance activities; final reclamation and abandonment; and hazardous materials and solid waste under the Proposed Action are identical to those previously described in **Section 2.2**, *Development Activities Common to All Action Alternatives,* and will not be repeated further in this section. Details of project activities, design features, and surface disturbance summaries that are unique to the Proposed Action are described in the following sections.

2.3.1 Alternative-specific Activities

2.3.1.1 Well Pad Construction

Under the Proposed Action, Newfield proposes to construct and develop 5,750 wells, consisting of approximately 750 new Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing (to be eventually converted to injection wells for waterflood recovery), 2,500 new Green River oil wells on 20-acre downhole spacing to be directionally drilled from existing or the above-described new well pads, and 2,500 new deep gas well pads and vertical wells on 40-acre surface density and downhole spacing. With associated cut and fill slopes, new Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing would be constructed to average dimensions of approximately 250 feet x 350 feet (2-acres in size), while new deep gas well pads and vertical wells on 40-acre surface density and downhole spacing would be constructed to average dimensions of approximately 300 feet x 425 feet (3-acres in size). Where the 2,500 new Green River oil wells on 20-acre downhole spacing would be directionally drilled from existing pads or the above-described new well pads, it is assumed for the purposes of analysis that each of these pads would be expanded by approximately 0.2 acres per new well. Therefore, the initial surface disturbance resulting from the construction of all 5,750 wells would be approximately 9,500 acres (see **Table 2.3-1**). This would include approximately 1,500 acres for the 750 new Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing, 500 acres for the 2,500 new Green River oil wells on 20-acre downhole spacing directionally drilled from existing or the above new well pads, and 7,500 acres for the 2,500 new deep gas well pads and vertical wells on 40-acre surface density and downhole spacing. Following well completion activities, portions of each well pad not needed for production operations would be reclaimed according to specifications of the BLM or UDOGM, as appropriate. Therefore, long-term disturbance associated with construction of the 5,750 well pads would be reduced from approximately 9,500 acres to 3,750 acres, following successful interim reclamation.

2.3.1.2 Access Road Construction

Additional surface disturbance could occur along existing access where site-specific upgrades or improvements could require up to 10 feet of additional expansion or modification of the existing road corridor. Under the Proposed Action, approximately 363 miles of existing roads within the MBPA would require some level of expansion and/or upgrades to accommodate increased oil and gas activity and to install pipeline corridors adjacent to the existing roads (see **Sections 2.2.2.3** and **2.2.2.4**). In addition, approximately 243 miles of new access road would be constructed on BLM, State, and private lands. Nearly all of the new access roads would be paralleled by pipelines (i.e., co-located roads and pipelines). Existing roads that would need upgrades or expansion and conceptual locations for proposed roads are illustrated on **Figure 2-1 (Attachment 1)**.

TABLE 2.3-1
SURFACE DISTURBANCE UNDER THE PROPOSED ACTION

Project Feature	Size (disturbance width [feet] or acres/facility)	Federal Lands			State Lands			Private Lands			Project Total		
		Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]	Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]
Well Pads													
New Green River Oil Well Pads for Vertical Wells on 40-Acre Surface Density and Downhole Spacing	2.0 acres per well pad	632	1,264	632	86	172	86	32	64	32	750	1,500	750
New Green River Oil Wells on 20-acre Downhole Spacing Directionally Drilled from Existing or the above New Well Pads	0.2 acre per well	2,135	427	427	300	60	60	65	13	13	2,500	500	500
New Deep Gas Well Pads and Vertical Wells on 40-Acre Surface Density and Downhole Spacing	3.0 acres per well pad	2,135	6,405	2,135	300	900	300	65	195	65	2,500	7,500	2,500
Subtotal	--	**4,902**	**8,096**	**3,194**	**686**	**1,132**	**446**	**162**	**272**	**110**	**5,750**	**9,500**	**3,750**
Total Number of New Well Pads	--	**2,767**	--	--	**386**	--	--	**97**	--	--	**3,250**	--	--
Access Roads													
New Roads Co-located with Pipelines	40 feet[2]	208 miles	1,008	1,008	31 miles	150	150	4 miles	19	19	243 miles	1,178	1,178
Existing Roads Co-located with New Pipelines	10 feet[3]	311 miles	377	377	34 miles	41	41	18 miles	22	22	363 miles	440	440
Subtotal	--	**519 miles**	**1,385**	**1,385**	**65 miles**	**192**	**192**	**22 miles**	**41**	**41**	**606 miles**	**1,618**	**1,618**
Pipelines													
Pipelines Co-located with New Roads	60 feet[4]	208 miles	1,513	630	31 miles	225	94	4 miles	29	12	243 miles	1,767	736[5]
Pipelines Co-located with Existing Roads	60 feet[4]	311 miles	2,262	942	34 miles	247	103	18 miles	131	55	363 miles	2,640	1,100[5]
Subtotal	--	**519 miles**	**3,775**	**1,573**	**65 miles**	**473**	**197**	**22 miles**	**160**	**67**	**606 miles**	**4,407**	**1,836**
Central Facilities													
Compressor Stations (New and Upgrades)	9.4 acres (avg.)	21	197	197	3	28	28	0	0	0	24	226	226
Gas Processing Plants	10.0 acres	0	0	0	1	10	10	0	0	0	1	10	10
Water Treatment and Injection Facilities	8/5 acres[6]	12	78	0	1	8	0	0	0	0	13[7]	86	86
Gas and Oil Separation Plants (GOSPs)	22.0 acres	10	220	220	2	44	44	0	0	0	12	264	264
Fresh Water Collector Well	1.7 acre	1	0	0	0	0	0	0	0	0	1	1.7	0.7
Pump Stations	3.0 acres	5	15	15	0	0	0	1	3	3	6	18	18
Subtotal	--	**49**	**433**	**433**	**7**	**82**	**82**	**1**	**3**	**3**	**57**	**604**	**604**
Total New Disturbance	--	--	**13,767**	**6,663**	--	**1,886**	**925**	--	**476**	**221**	**-**	**16,129[8]**	**7,808**

Source Note: Project totals for numbers of wells, miles of roads/pipelines, and numbers of facilities have been broken down by federal, state and private surface land categories for analysis purposes only. These totals represent a rough estimate based on conceptual locations of surface facilities and infrastructure.

[1] Residual disturbance calculations are based on the assumption that interim reclamation would be initiated and successful.

[2] Initial disturbance assumes that a 100-foot wide disturbance corridor would be needed for construction, of which 40 feet would be used for new road construction and 60 feet for pipeline installation.

[3] Initial disturbance assumes that a 70-foot wide disturbance corridor would be needed for construction, of which 10 feet would be used for general road improvements and 60 feet for pipeline installation.

[4] Initial disturbance assumes that a 60-foot wide disturbance corridor would be needed for pipeline installation within new and existing road ROWs.

[5] Residual disturbance assumes that 35-foot wide portion of the original 60-foot wide disturbance corridor would be reclaimed leaving a 25-foot wide corridor for the long-term pipeline corridor.

[6] Each new water treatment and injection facility would occupy a site approximately 8 acres in size. Existing water treatment and injection facility locations proposed for expansion would be increased in size by approximately 5 acres each.

[7] Includes seven new and six expanded water treatment and injection facilities.

[8] Numbers are rounded to the nearest whole number.

Existing road ROWs would require an expansion width of approximately 70 feet, of which 10 feet would be needed for general road improvements, and the remaining 60 feet would be used for the installation of pipelines. Because surface pipelines would typically be constructed on one side of the road and buried pipelines constructed on the opposite side of the road, these analyses assume that surface disturbance due to pipelines that are co-located with roads would average 60 feet wide. Therefore, the initial surface disturbance resulting from expansion and/or upgrades to existing roads and associated pipeline corridors would be approximately 1,618 acres, which includes an estimated 440 acres for road expansion and/or upgrades and 1,178 acres for pipeline installation. Following construction activities, a 35-foot-wide portion of the initial 60-foot width disturbance corridor for pipelines not needed for operational activities would be reclaimed. This would leave a 25-foot width for the long-term ROW, which would reduce the long-term disturbance associated with new roads co-located with pipelines to 1,618 acres.

Where new co-located roads and buried pipeline are proposed, an initial 100-foot disturbance width would be needed for construction purposes. Of the initial 100-foot-wide disturbance corridor, a 40-foot width would be used for road construction, and a 60-foot width would be used for the installation of pipelines. Therefore, the initial surface disturbance resulting from the construction of new access roads and associated pipeline corridors would be approximately 6,025 acres, which includes an estimated 1,618 acres for access roads and 4,407 acres for pipeline installation. Following construction activities, a 35-foot-wide portion of the initial 60-foot width disturbance corridor for pipelines not needed for operational activities would be reclaimed. This would leave a 25-foot width for the long-term ROW, which would reduce the long-term disturbance associated with new roads co-located with pipelines to 1,836 acres.

2.3.1.3 Pipeline Construction

Under the Proposed Action, the existing pipeline gathering system within the MBPA would be expanded to convey oil and gas production volumes from proposed wells. This expansion would be accomplished both by installing pipelines within new pipeline corridors and by installing additional pipelines within or adjacent to existing pipeline corridors. In most instances, gathering pipelines, fuel system pipelines, water injection pipelines, and produced water pipelines would be installed parallel to and/or within access road ROWs unless precluded by topography, county regulations (if installed adjacent to county-maintained roads), or gathering system constraints.

As previously addressed in **Section 2.3.1.2**, approximately 243 miles of pipeline would be installed adjacent to proposed access roads (co-located), and approximately 363 miles of pipeline would be installed along existing roads. Existing road corridors would require an expansion width of approximately 70 feet, of which 60 feet would be used for the installation of pipelines, and the remaining 10 feet would be used for general road improvements (see **Sections 2.2.2.3** and **2.2.2.4**). Installation of proposed pipelines along existing roads would result in approximately 2,640 acres of initial surface disturbance. Following construction activities, a 35-foot-wide portion of the initial 60-foot width disturbance corridor for pipelines not needed for operational activities would be reclaimed. This would leave a 25-foot width for the long-term ROW, which would reduce the long-term disturbance associated with pipelines co-located with existing roads to 1,100 acres. As indicated in **Section 2.2.2.2**, in limited situations, a proposed pipeline would be installed independent of an access road (i.e., cross-country). Under Alternative A, an estimated 60 miles of cross-country pipeline could be installed. Based on a 50-foot-wide ROW, cross-country pipelines could result in approximately 366 acres of surface disturbance. As there are no conceptual locations for cross-country pipelines they are not shown on maps for Alternative A, nor are they included in the GIS-based disturbance calculation tables.

Where pipelines are proposed for co-location with new roads, an initial 100-foot disturbance width would be needed for construction purposes. Of the initial 100-foot disturbance width, a 60-foot width would be

used for the installation of pipelines, and a 40-foot width would be used for road construction (see **Sections 2.2.2.3** and **2.2.2.4**). Installation of a proposed pipeline along new roads would result in approximately 1,767 acres of initial surface disturbance. Following construction activities, a 35-foot-wide portion of the initial 60-foot disturbance width for pipelines not needed for operational activities would be reclaimed. This would leave a 25-foot width for the long-term ROW, which would reduce the long-term disturbance associated with pipelines co-located with new roads to 736 acres.

2.3.1.4 Compressor Stations

Under the Proposed Action, Newfield would expand the current compressor system to accommodate expanded gas production from both oil and deep gas wells within the MBPA. This expansion would be achieved by adding new compressor stations and upgrading existing stations with larger capacity units. To accommodate expanded production at the deep gas wells, Newfield would construct 20 new compressor stations. Each new compressor station would occupy a site approximately 10 acres in size and could include up to 8,000 hp of compression. For associated gas produced with the Green River oil wells, Newfield would expand three existing compressor stations and construct 21 new compressor stations (see conceptual compressor station locations on **Figure 2-1 - Attachment 1**). Existing compressor stations for the Green River wells would be expanded by approximately 5 acres each to accommodate additional facilities that would include up to 5,000 hp of additional compression. The new compressor station would occupy a site approximately 10 acres in size and would include up to 8,000 hp of compression. Therefore, the initial surface disturbance resulting from the construction of 21 new compressor stations and expansion of three existing stations would be approximately 226 acres, which includes an estimated 210 acres for new compressor stations and 15 acres for expansion of existing facilities. The combined total compression of these facilities within the MBPA would be approximately 183,000 hp.

Central facilities, including the compressor stations would not be reclaimed during interim reclamation because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 226 acres.

2.3.1.5 Central Gas Processing Plant

The conceptual location for the proposed gas processing plant is the same under all of the action alternatives and is illustrated on **Figure 2-1 (Attachment 1)**. Construction of the proposed gas processing plant would require the disturbance of approximately 10 acres.

Central facilities, including the proposed gas processing plant, would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 10 acres.

2.3.1.6 Water Treatment and Injection Facilities

Under the Proposed Action, Newfield would construct seven new water treatment and injection facilities within the MBPA, and expand six existing facilities. The proposed water treatment facilities would be used for recycling of produced water that either would be co-mingled with fresh water and piped for waterflood injection wells or trucked from the facility to be used at subsequent wells for completion activities.

Each new water treatment and injection facility would occupy a site approximately 8 acres in size. Existing water treatment and injection facility locations proposed for expansion would be increased in size by approximately 5 acres each. Therefore, the initial surface disturbance resulting from the construction of seven new water treatment and injection facilities and expansion of six existing facilities would be approximately 86 acres.

As with other central facilities, water treatment and injection facilities would not be reclaimed during interim reclamation because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 86 acres.

2.3.1.7 Gas and Oil Separation Plants (GOSPs)

Under the Proposed Action, Newfield would construct up to 12 new GOSPs that would be used for the initial separation of produced water and gas from the oil prior to shipment to the refinery for further processing. Conceptual locations for proposed GOSPs are illustrated on **Figure 2-1 (Attachment 1)**. Each new GOSP would occupy a site approximately 22 acres in size. Therefore, the initial surface disturbance resulting from the construction of proposed GOSPs within the MBPA would be approximately 264 acres.

As with other production facilities, GOSPs would not be reclaimed during interim reclamation because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 264 acres.

2.3.1.8 Pump Stations

Under the Proposed Action, Newfield would construct up to six water pump stations, which would boost pressure to ensure consistent delivery of fresh and produced water to the water treatment and injection facilities within the MBPA. Each new pump station would occupy a site approximately 3 acres in size, which would result in a total surface disturbance of 18 acres.

As with other production facilities, initial surface disturbance associated with the construction of pump stations would not be reclaimed during interim reclamation, because the entire disturbed area would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 18 acres.

2.3.2 Well Drilling

Under the Proposed Action, Newfield proposes to drill up to 5,750 oil and gas wells to the Green River Formation, of which 750 wells would be vertically drilled on a 40-acre downhole spacing pattern and 2,500 wells would be directionally or horizontally drilled on a 20-acre downhole spacing pattern. In addition, Newfield would drill 2,500 deep gas wells to the Green River, Wasatch, Mesaverde, Blackhawk/Mancos, and/or Frontier/Dakota formations on a 40-acre downhole spacing pattern. The Green River oil wells would be drilled to a total depth of between 4,500 and 6,500-feet bgs, and the proposed deep gas wells would be drilled to a total depth of between 13,000 and 18,000-feet bgs, depending on the specific depth of the target formation. Of the 5,750 wells drilled under the Proposed Action, approximately 4,902 would be drilled on Federal Lands; 686 would be drilled on State lands; and 162 wells would be drilled on private land (see **Table 2.3-1**). The numbers of wells have been broken down by federal, state and private surface land categories for analysis purposes only, and they could change based on site-specific conditions.

Based upon current technology and drilling rates in the MBPA, up to 12 drilling rigs could be active in the MBPA at any given time. Depending on the type of well drilled (i.e., Green River oil well or deep gas well), an average of 360 wells would be drilled annually. Also, based on the amount of days needed to drill a deep gas well, the timeframe to fully explore and develop the resource may need to be extended up to 30 years. The continued deep gas exploration program may or may not be initiated immediately upon the start of the proposed project and would be dependent on current and near-term commodity pricing for natural gas.

2.3.3 Interim Reclamation

Under the Proposed Action, approximately 8,321 acres of initial disturbance (52 percent) associated with construction of proposed well pads, road and pipeline ROWs, and other project facilities not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of the Proposed Action to approximately 7,808 acres.

2.3.4 Water Requirements

A breakdown of water requirements for well drilling and completion, dust suppression, and waterflooding operations under the Proposed Action is presented in Table 2.3.4-1.

TABLE 2.3.4-1
WATER REQUIREMENTS FOR WELL DRILLING AND COMPLETION, DUST SUPPRESSION, AND WATERFLOODING OPERATIONS UNDER THE PROPOSED ACTION

Activity/Phase	Number of Wells	Amount of Water Required per Well (acre-feet)	Total Water Use (acre-feet)	Annual Water Use (acre-feet)
Well Drilling and Completion[1]				
New Green River Oil Wells on 40-Acre Surface Density and Downhole Spacing	750	0.9	675	42*
New Green River Oil Wells on 20-acre Downhole Spacing on Existing and/or Proposed 40-acre Surface Density Green River Oil Well Pads	2,500	0.9	2,250	141*
New Deep Gas Well Pads and Vertical Wells on 40-Acre Surface Density and Downhole Spacing	2,500	6.2	15,500	967*
Subtotal for the 16-year active well drilling and completion period	**5,750**	**--**	**18,425**	**1,150***
Dust Suppression				
Construction of New Well Pads and Associated Roads and Pipeline/Utility Corridors	575	0.08[2]	46	3
Subtotal for the 16-year active well drilling and completion period	**575**	**--**	**46**	**3**

Activity/Phase	Number of Wells	Amount of Water Required per Well (acre-feet)	Total Water Use (acre-feet)	Annual Water Use (acre-feet)
Operation of New Well Pads and Associated Roads and Pipeline/Utility Corridors	575	0.13[3]	1,500 - 2,250[4]	75
Subtotal for the 20- to 30-Year Construction and Operational Period	**--**	**--**	**1,500 - 2,250**	**75**
Waterflooding Infrastructure and Operations				
Conversion of up to 750 Proposed Wells to Injection Wells	750	0.01[5]	54,760 – 82,140[6]	2,738[7]
Subtotal for the 20- to 30-Year Construction and Operational Period	**--**	**--**	**54,760 – 82,140**	**2,738**
TOTAL	**--**	**--**	**74,731 – 102,861**	**3,966**

[1] Assumes a 16-year active well drilling and completion period.

[2] Approximately five water truck (approximately 650-bbls or 0.08 acre-feet) would be needed for dust suppression per new well pad, access road, and pipeline/utility corridor during construction activities, for approximately 10 percent of the proposed project (i.e., up to 575 new well pads and their associated roads, pipeline/utility corridors, and other surface facilities).

[3] Approximately eight water truck (approximately 1000-bbls or 0.13 acre-feet) would be needed annually for dust suppression per new well pad, access road, and pipeline/utility corridor during project operation, for approximately 10 percent of the proposed project (i.e., up to 575 new well pads and their associated roads, pipeline/utility corridors, and other surface facilities).

[4] Calculated based on 75.0 acre-feet annually over the 20- to 30-year construction and operational period.

[5] Assumes 0.01 acre-feet of water per well daily.

[6] Calculated based on 2,738 acre-feet annually over the 20- to 30-year construction and operational period.

[7] Based on a 20-year period during which producing wells would be converted to injection wells.

[*] Based on average annual water use.

Note: Summations may not total precisely due to rounding.

2.3.4.1 Drilling and Completion

An estimated average of 7,000 bbls (0.9 acre-feet) of water would be required to drill and complete an individual Green River oil well, and up to 48,000 bbls (6.2 acre-feet) of water would be required to drill and complete a deep gas well. Water used during the drilling and completion phase at an individual well would be piped to the water treatment and injection facilities for treatment/recycling. Total water use for drilling and completion of all 5,750 wells under the Proposed Action would be approximately 18,425 acre-feet.

2.3.4.2 Dust Suppression

For purposes of analysis in this EIS, Newfield assumes that approximately five water truck equivalents (approximately 650 bbls or 0.08 acre-feet) would be needed for dust suppression per new well pad, associated access road, and pipeline/utility corridor during construction activities, for approximately 10 percent of the proposed project (i.e., for approximately 325 new well pads and their associated roads, pipeline/utility corridors, and other surface facilities). Therefore, based on these assumptions, Newfield would use a total of approximately 26 acre-feet of water for dust suppression during construction activities under the Proposed Action.

In addition, approximately 1,000 bbls (0.13 acre-feet) of water would be needed annually for dust suppression per well pad, associated access road, and pipeline/utility corridor during project operation, again for approximately 10 percent of the proposed project (i.e., for approximately 325 well pads and their associated roads, pipeline/utility corridors, and other surface facilities). Based on these assumptions, implementation of the Proposed Action would require approximately 42 acre-feet of water per year for dust abatement during project operations.

2.3.4.3 Waterflooding Infrastructure and Operations

Newfield would use waterflooding technology on all of the proposed 40-acre spaced Green River wells (i.e., approximately 750 wells) after about the first 3 years of production. A total of approximately 75 to 100 bpd, or approximately 0.01 acre-feet per day, of water would be required for each waterflood injection well under the Proposed Action. Newfield would convert approximately 750 of their proposed wells to injection wells, therefore requiring approximately 7.5 acre-feet of fresh and produced water per day for injection purposes. Based on the requirement of 7.5 acre-feet of water per day, the annual water requirement for waterflooding operations would be approximately 2,738 acre-feet.

2.3.5 Produced Water Disposal

Under the Proposed Action, seven new and six expanded water treatment and injection facilities, and three water disposal wells, could be constructed. As previously noted in **Section 2.3.1.6**, surface disturbance from the proposed water management facilities would be approximately 86 acres. Surface disturbance from construction and drilling of the water disposal wells is included in the surface disturbance summarized for well pads. In addition, up to six pump stations would be constructed under the Proposed Action, disturbing a total of approximately 18 acres.

Water disposal wells would be drilled in the MBPA on existing well pads or using existing well borings. Assuming an average disposal capacity of 4,000 barrels of water per day (BWPD) for each disposal well, the three new disposal wells would have a combined capacity of 12,000 BWPD. Although future water production is difficult to predict because of variable water saturation conditions as the oil and gas formations are produced and depleted, it is estimated for purposes of analysis in this EIS that Newfield will recycle nearly all of the water that would be produced under the Proposed Action for use in waterflood operations.

Disposal well locations would be chosen based on suitable subsurface rock formation properties and water quality data. Each new water disposal well would add approximately 0.2 acres of new disturbance to an existing well pad, for a total maximum new surface disturbance of 0.6 acres.

2.3.6 Workforce Requirements

The active workforce needed to develop the Proposed Action is shown in **Table 2.3.6-1**.

TABLE 2.3.6-1
ESTIMATED WORKFORCE REQUIREMENTS UNDER THE PROPOSED ACTION

Work Category	Time Requirements	Number of Facilities	Personnel Required (No. per day)	Workdays for Project	Average Workdays per Year	Average Workers per Day[1]
Construction and Installation						
Access Road	4 days/mile	606 miles	8	19,392	1,212	5
Well Pad	3 days/site	3,250	8	78,000	4,875	20
Pipelines	10 days/mile	606 miles	10	60,600	3,788	16
Drilling and Casing	4 days/well	5,750	8	184,000	11,500	48
Well Completion	4 days/well	5,750	20	460,000	28,750	120
Well Production	10 days/well	5,750	16	920,000	57,500	240
Central Facilities	45 days/site	57	20	51,300	3,206	13
Total				**1,773,292[2]**	**110,831**	**458**
Operation and Maintenance						
Road/Well Pad Maintenance	120 days/year	N/A	3	16,560	360	2
Pumpers	260 days/year	N/A	36	430,560	9,360	39
Office	260 days/year	N/A	4	47,840	1,040	4
Well Workover	5 days/well	30 per year	2	13,800	300	1
Total				**508,760[3]**	**11,060**	**46**
Reclamation and Abandonment[4]						
Well Pads	3 days/well pad	3,250	4	69,000	N/A	--
Roads and Pipelines	4 day/mile	606 miles	4	9,696	N/A	--
Central Facilities	30 day/facility	57	16	27,360	N/A	--
Total				**106,056**	--	--

[1] Average workdays per year divided by an assumed 240 days in a work year.
[2] Based on a 16-year construction schedule.
[3] Based on a 46-year production and operation schedule.
[4] Includes interim reclamation.

2.4 ALTERNATIVE B – NO ACTION

Under the No Action Alternative, the proposed oil and gas infill development project on public land surface and/or federal mineral estates as described in the Proposed Action would not be implemented. However, proposed oil well development would likely continue on State and private lands or minerals within the MBPA, subject to the approval of UDOGM and/or the appropriate private land owner. This EIS evaluates proposed development on State and private lands or minerals under the No Action alternative (and all alternatives), but the BLM does not have jurisdiction over State and private land or minerals. Therefore, the ROD for this EIS will not include decisions specific to State and private lands or minerals. Reasonable access across BLM-administered surface to proposed well pads and facilities on State and private lands or minerals could also occur under the No Action Alternative, as allowed by Federal regulations. Development, production, and maintenance activities for wells approved under the August 2005 ROD for the Castle Peak and Eight Mile Flat Oil and Gas Expansion EIS would also continue on BLM-administered lands. Activities and project components on federal lands discussed in the No Action Alternative are not unique to Newfield's Proposed Action as analyzed in this DEIS. Those activities and components either have been analyzed in prior NEPA documents or will be analyzed in future NEPA documents.

A summary of surface disturbance associated with implementation of the No Action Alternative is presented in **Table 2.4-1**. This includes development approved through other NEPA documents or approved by other agencies but not yet constructed as of December 31, 2011 (see **Table 2.4-2**), plus conceptual facilities on State and private surface land. The "as of" December 31, 2011 date footnoted under **Table 2.4-2** was selected as a fixed point in time to represent information that is continuously changing. While the BLM recognizes there is a gap between this point in time and the publication date of this document, the information provides a consistent basis for evaluation of the Proposed Action and alternatives.

TABLE 2.4-1
SURFACE DISTURBANCE UNDER THE NO ACTION ALTERNATIVE

Project Feature	Size (disturbance width [feet] or acres/facility)	Federal Lands			State Lands			Private Lands			Project Total		
		Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]	Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]
Well Pads													
New Green River Oil Well Pads and Vertical Wells on 40-Acre Surface Density and Downhole Spacing	2.0 acres per well pad	0	0	0	107	214	107	21	42	21	128	256	128
New Green River Oil and/or Deep Gas Wells on 20-acre Downhole Spacing Directionally Drilled from Existing or the above New Well Pads	0.2 acres per well	0	0	0	295	59	59	124	25	25	419	84	84
Wells Remaining to be Drilled under other Approved or Proposed Newfield Projects	0.2 acres[2] per well	241	48	48	0	0	0	0	0	0	241	48	48
Subtotal	--	**241**	**48**	**48**	**402**	**273**	**166**	**145**	**67**	**46**	**788**	**388**	**260**
Total Number of New Well Pads	--	**0**	--	--	**107**	--	--	**21**	--	--	**369**	--	--
Access Roads													
New Roads Co-located with Pipelines	40 feet[3]	0 miles	0	0	21 miles	102	102	2.5 miles	12	12	23.5 miles	114	114
Existing Roads Co-located with New Pipelines	10 feet[4]	1.5 miles	2	2	30.5 miles	37	37	13 miles	16	16	45 miles	55	55
Subtotal	--	**1.5 miles**	**2**	**2**	**51.5 miles**	**139**	**139**	**15.5 miles**	**28**	**28**	**68 miles**	**169**	**169**
Pipelines													
Pipelines Co-located with New Roads	30 feet[5]	0 miles	0	0[6]	21 miles	76	51[6]	2.5 miles	9	6[6]	23.5 miles	85	57[6]
Pipelines Co-located with Existing Roads	30 feet[5]	1.5 miles	5.5	3.5[6]	30.5 miles	111	74[6]	13 miles	47	31.5[6]	45 miles	164	109[6]
Subtotal	--	**1.5 miles**	**5.5**	**3.5**	**51.5 miles**	**187**	**125**	**15.5 miles**	**56**	**37**	**68 miles**	**249**	**166**
Central Facilities[7]													
Compressor Stations (New and Upgrades)	10.0 acres	2	20	20	0	0	0	0	0	0	2	20	20
Gas Processing Plants	10.0 acres	0	0	0	1	10	10	0	0	0	1	10	10
Water Treatment and Injection Facilities	7.0 acres	0	0	0	1	7	7	0	0	0	1	7	7
Gas and Oil Separation Plants (GOSPs)	22.0 acres	0	0	0	1	22	22	0	0	0	1	22	22
Fresh Water Collector Well	1.7 acres	1	0	0	0	0	0	0	0	0	1	1.7	.7
Pump Stations	5.0 acres	0	0	0	1	5	5	0	0	0	1	5	5
Subtotal	--	**0**	**20**	**20**	**4**	**44**	**44**	**0**	**0**	**0**	**7**	**64**	**64**
Total New Disturbance	--	--			--			--			--	**870**	**659**

Source Note: Project totals for numbers of wells, miles of roads/pipelines, and numbers of facilities have been broken down by federal, state and private surface land categories for analysis purposes only. These totals represent a rough estimate based on conceptual locations of surface facilities and infrastructure.

[1] Residual disturbance calculations are based on the assumption that interim reclamation will be initiated and successful.
[2] For purposes of analysis, approximately half of the wells are assumed to be vertical wells drilled on existing well pads and half are assumed to be vertical wells drilled on new 2-acre well pads.
[3] Initial disturbance assumes that a 70-foot wide disturbance corridor would be needed for construction, of which 40 feet would be used for new road construction and 30 feet for pipeline installation.
[4] Initial disturbance assumes that a 40-foot wide disturbance corridor would be needed for construction, of which 10 feet would be used for general road improvements and 30 feet for pipeline installation.
[5] Initial disturbance assumes that a 30-foot wide disturbance corridor would be needed for pipeline installation within new and existing road ROWs in the absence of utility lines.
[6] Residual disturbance assumes that a 10-foot wide portion of the original 30-foot wide disturbance corridor would be reclaimed leaving a 20-foot wide corridor for the long-term pipeline corridor.
[7] Central facilities would not likely be constructed on federal surface under the No Action alternative. However, for the purposes of consistent analysis amongst the alternatives the facilities are conceptually shown on federal surface.

TABLE 2.4-2
PREVIOUSLY APPROVED AND PLANNED OIL AND NATURAL GAS DEVELOPMENT PROJECTS ON BLM-ADMINISTERED LANDS IN THE MBPA UNDER THE NO ACTION ALTERNATIVE

Project	Development Approved	Number of Wells Drilled and in Production	Number of Wells Remaining to be Drilled and Placed in Production under the Castle Peak EIS and MDP EAs[1]
Castle Peak and Eight Mile Flat Oil and Gas Expansion EIS	778[2]	560	218
Other NEPA[3]	23	--	23
Total	**801**	**560**	**241[1]**

[1] As of December 31, 2011.

[2] Although 923 wells were assessed in the Castle Peak and Eight Mile Flat EIS (with 150 of those planned for conversion to waterflood injection for a net of 823 producing wells) the August 2005 ROD approved a net of only 778 producing wells.

[3] Other NEPA includes approved Master Development Plans (MDPs) Number 17 through 22 and 25. MDPs 17 through 22 and 25 authorized a total of 146 wells; however, only 23 of those wells are outside of the Castle Peak Project Area.

Based on the projects presented in **Table 2.4-2**, it is estimated that approximately 241 wells remain to be drilled on BLM-administered lands, in addition to the 3,395 existing wells within the MBPA (as of December 31, 2011).

In addition to the approved 241 wells that have not yet been drilled, an additional approximately 547 oil and gas wells would be developed on State and private lands or minerals in the MBPA under the No Action Alternative, for a total of 788 producing wells. Newfield proposes to drill wells at an average rate of up to 360 wells per year. Under this drilling scenario, construction, drilling, and completion of all 788 wells would occur over an approximately 2.2-year period. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated LOP under the No Action Alternative would be approximately 28 to 38 years.

Conceptual locations for the approximately 788 wells on Federal, State, and private lands are illustrated on **Figure 2-2 (Attachment 1)**. Development methods on State and private lands or minerals would be essentially identical to those used to develop wells on BLM-administered lands, subject to UDOGM or private landowner requirements.

Key components of the No Action Alternative include the following (see **Figure 2-2 – Attachment 1)**:

- Development of up to 128 Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing that would be drilled from new 2-acre well pads, all of which would eventually be converted into waterflood injection wells;

- Development of up to 419 Green River oil and/or deep gas wells on 20-acre downhole spacing that would be directionally drilled from existing or the above-described new well pads, with average additional surface disturbance of about 0.2 acres per well;
- Development of up to 241 additional Green River oil wells from other previously approved and planned Newfield oil and natural gas development projects. For purposes of analysis, approximately half of the wells are assumed to be vertical wells drilled on existing well pads and half are assumed to be vertical wells with average new surface disturbance of about 0.2 acres per well;
- Construction of approximately 23 miles of new 70-foot-wide ROW that would be used for new road construction (40-foot width) and pipeline installation (30-foot width).
- Construction of approximately 45 miles of 70-foot-wide ROW that would be used for up to 40-foot-wide expansion of existing access road ROW for co-located road upgrade (10-foot width) and pipeline installation (30-foot width); ;
- Construction of up to two (2) new 8,000-hp compressor stations;
- Construction of a 50 MMscf/d centralized Green River oil well gas processing plant;
- Construction of one new water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of one new GOSP for oil and produced water collection; and
- Construction of one water pump station.

Surface disturbance anticipated under the No Action Alternative is shown in **Table 2.4-1**. Initial surface disturbance would occur during and immediately after the construction, drilling, completion, and testing activities. Prior to interim reclamation, initial surface disturbance for well pads, access roads, pipeline ROWs, and other surface facilities would equal approximately 870 acres. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within two to three growing seasons, assuming optimal conditions are present. The remaining surface disturbance would be residual or "long-term" disturbance of approximately 659 acres for the 28- to 38-year LOP.

Specific details of construction-related activities and specific design features for well drilling and completion; production, operations, and maintenance activities; final reclamation and abandonment; and hazardous materials and solid waste under the No Action Alternative are identical to those previously described in **Section 2.2**, *Development Activities Common to All Action Alternatives,* and will not be repeated further in this section. Specific details of project activities, specific design features, and surface disturbance summaries that are unique to the No Action Alternative are described in the following sections.

2.4.1 Alternative-specific Activities

2.4.1.1 Well Pad Construction

Under No Action Alternative, Newfield would construct and develop an additional 547 wells, consisting of 128 new Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing (to be eventually converted to injection wells for waterflood recovery), and 419 new Green River oil and/or deep gas wells on 20-acre downhole spacing that would be directionally drilled from existing or the above-described new well pads. Where the 419 new Green River oil and/or deep gas wells on 20-acre downhole spacing would be directionally drilled from existing or the above-described new well pads, it is assumed for the purposes of analysis that these pads would require an enlargement of 0.2 acres per new well.

Newfield would also develop an additional 241 oil and gas wells from other previously approved and planned projects. For purposes of analysis, approximately half of the wells are assumed to be vertical wells drilled on existing well pads and half are assumed to be vertical wells drilled on new 2-acre well pads. Therefore, the initial surface disturbance resulting from the construction of all 788 wells (547 wells on State and private surface land and 241 wells from other previously approved and planned projects) would be approximately 388 acres (see **Table 2.4-1**). This would include approximately 256 acres for the 128 new Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing, 84 acres for the new Green River oil and/or deep gas wells on 20-acre downhole spacing directionally drilled from existing or the above new well pads, and 48 acres for the vertical oil and gas wells from other previously approved and planned projects. Following well completion(s), portions of the well pad not needed for production would be reseeded and reclaimed, according to specifications of the appropriate SMA. Assuming successful interim reclamation, long-term well pad disturbance under the No Action alternative would be reduced to approximately 260 acres.

2.4.1.2 Access Road Construction

Implementation of the No Action Alternative would require the construction of up to 23.5 miles of new access roads and expansion and/or upgrades to approximately 45 miles of existing roads on State and private surface lands. ROWs and surface corridor widths for roads under the No Action Alternative would be similar to those described in **Section 2.3.1.2**. Therefore, the initial surface disturbance resulting from the construction of new access roads and expansion and/or upgrades to existing roads would be approximately 114 acres and 55 acres, respectively.

2.4.1.3 Pipeline Construction

Under the No Action Alternative, approximately 23.5 miles of pipeline would be installed adjacent to proposed access roads (co-located) and approximately 45 miles of pipeline would be installed along existing roads (see **Table 2.4-1)**. ROWs and surface corridor widths for pipelines under the No Action Alternative would be less than those in the action alternatives because a fewer number of individual pipelines would be installed within the ROW under this alternative. Therefore, under the No Action Alternative, approximately 30 feet would be needed for the installation of pipelines. Following construction activities, a 10-foot-wide portion of the initial 30-foot width disturbance corridor for pipelines not needed for operational activities would be reclaimed. The residual long-term disturbance associated with these facilities would be 57 acres and 109 acres for pipelines co-located along new and existing roads, respectively. As indicated in **Section 2.2.2.2**, a proposed pipeline would be installed independent of an access road (i.e., cross-country) in limited situations. Under Alternative B, an estimated 6 miles of cross-country pipeline could be installed. Based on a 50-foot-wide ROW, cross-country pipelines could result in approximately 36 acres of surface disturbance. As there are no conceptual locations for cross-country pipelines they are not shown on maps for Alternative B, nor are they included in the GIS-based disturbance calculation tables.

2.4.1.4 Compressor Stations

Under the No Action Alternative, Newfield would construct up to two new compressor stations within the MBPA. Each compressor station would occupy a site approximately 10 acres in size and could include up to 8,000 hp of compression. Therefore, the initial surface disturbance resulting from the construction of the two new compressor stations would be approximately 20 acres.

Central facilities, including the compressor stations, would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore,

the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 20 acres.

2.4.1.5 Central Processing Plant

The conceptual location for the proposed gas processing plant is the same under all of the action alternatives and is illustrated on **Figure 2-3 (Attachment 1)**. Construction of the proposed gas processing plant would require the disturbance of approximately 10 acres.

Central facilities, including the proposed central gas processing plant, would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 10 acres.

2.4.1.6 Water Treatment and Injection Facilities

Under the No Action Alternative, Newfield would construct one (1) new treatment and injection facility within the MBPA. The water treatment and injection facility would occupy a site approximately 7 acres in size.

As with other central facilities, water treatment and injection facilities would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 7 acres.

2.4.1.7 Gas and Oil Separation Plants (GOSPs)

Under the No Action Alternative, Newfield would construct one new GOSP that would be used for the initial separation of produced water and gas from the oil prior to shipment to the refinery for further processing. The new GOSP would occupy a site approximately 22 acres in size.

As with other central facilities, GOSPs would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 22 acres.

2.4.1.8 Pump Stations

Under the No Action Alternative, Newfield would construct one water pump station, which would boost pressure to ensure consistent delivery of fresh and produced water to the water treatment and injection facilities within the MBPA. The new pump station would occupy a site approximately 5 acres in size.

As with other central facilities, initial surface disturbance associated with the construction of pump stations would not be reclaimed during interim reclamation, because the entire disturbed area would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 5 acres.

2.4.2 Well Drilling

Under the No Action Alternative, Newfield would construct and develop approximately 547 oil and gas wells on State and private lands in the MBPA. An additional 241 wells would be constructed on Federal, State, and private lands under other previously approved and planned projects. Of the 788 total wells drilled under the No Action Alternative, 241 would be drilled on Federal Lands, approximately 402 would be drilled on State lands, and 145 wells would be drilled on private land (see **Table 2.4-1**). The numbers of wells have been broken down by federal, state, and private surface land categories for analysis purposes only.

Based upon current technology and drilling rates in the MBPA, up to five drilling rigs could be active in the MBPA at any given time. Depending on the type of well drilled (i.e., Green River oil well or deep gas well), an average of 360 wells would be drilled annually. Also, based on the amount of days needed to drill a deep gas well, the timeframe to fully explore and develop the resource may need to be extended. The continued deep gas exploration program may or may not be initiated immediately upon the start of the proposed Project, and would be dependent on current and near-term commodity pricing for natural gas.

2.4.3 Interim Reclamation

Under the No Action Alternative, approximately 211 acres of initial disturbance (24 percent) associated with construction of proposed well pads, road and pipeline ROWs, and other project facilities not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of the No Action Alternative to approximately 659 acres.

2.4.4 Water Requirements

A breakdown of water requirements for well drilling and completion, dust suppression, and waterflooding operations under the No Action Alternative is presented in **Table 2.4.4-1**.

TABLE 2.4.4-1
WATER REQUIREMENTS FOR WELL DRILLING AND COMPLETION, DUST SUPPRESSION, AND WATERFLOODING OPERATIONS UNDER THE NO ACTION ALTERNATIVE

Activity/Phase	Number of Wells	Amount of Water Required per Well (acre-feet)	Total Water Use (acre-feet)	Annual Water Use (acre-feet)
Well Drilling and Completion[1]				
New Green River Oil Well Pads and Vertical Wells on 40- acre Surface Density and Downhole Spacing	128	0.9	115	52*
New Green River Oil and/or Deep Gas Wells on 20- acre Downhole Spacing Directionally Drilled from Existing or the above New Well Pads	419	0.9	377	171*

Activity/Phase	Number of Wells	Amount of Water Required per Well (acre-feet)	Total Water Use (acre-feet)	Annual Water Use (acre-feet)
Wells Remaining to be Drilled under other Approved or Proposed Newfield Projects	241	0.9	217	99
Subtotal for the 2.2-year active well drilling and completion period	**788**	**--**	**709**	**322***
Dust Suppression				
Construction of New Well Pads and Associated Roads and Pipeline/Utility Corridors	78	0.08[2]	6	4
Subtotal for the 2.2-year active well drilling and completion period	**--**	**--**	**6**	**4**
Operation of New Well Pads and Associated Roads and Pipeline/Utility Corridors	78	0.13[3]	203 - 304[4]	10
Subtotal for the 20- to 30-Year Construction and Operational Period	**--**	**--**	**203-304**	**10**
Waterflooding Infrastructure and Operations				
Conversion of up to 150 Proposed Wells to Injection Wells	150	0.01[5]	10,950 – 16,425	548[6]
Subtotal for the 20- to 30-Year Construction and Operational Period	**--**	**--**	**10,950 – 16,425**	**548**
TOTAL	**--**	**--**	**11,868 – 17,444**	**884**

[1] Assumes a 2.2-year active well drilling and completion period.

[2] Approximately five water truck (approximately 650-bbls or 0.08 acre-feet) would be needed for dust suppression per new well pad, access road, and pipeline/utility corridor during construction activities, for approximately 10 percent of the proposed project (i.e., up to 78 new well pads and their associated roads, pipeline/utility corridors, and other surface facilities).

[3] Approximately eight water truck (approximately 1000-bbls or 0.13 acre-feet) would be needed annually for dust suppression per new well pad, access road, and pipeline/utility corridor during project operation, for approximately 10 percent of the proposed project (i.e., up to 78 new well pads and their associated roads, pipeline/utility corridors, and other surface facilities).

[4] Calculated based on 10 acre-feet annually over the 20- to 30-year construction and operational period.

[5] Assumes 0.01 acre-feet of water per well daily.

[6] Based on a 20-year project period during which producing wells would be converted to injection wells.

[*] Based on average annual water use.

Note: Summations may not total precisely due to rounding.

2.4.4.1 Drilling and Completion

An estimated average of 7,000 bbls (0.9 acre-feet) of water would be required to drill and complete an individual Green River oil well or a deep gas well. Water used during the drilling and completion phase at an individual well would be piped to the water treatment and injection facilities for treatment/recycling.

Total water use for drilling and completion of all 788 wells under the No Action Alternative would be approximately 709 acre-feet.

2.4.4.2 Dust Suppression

As with other action alternatives, it is assumed that water would be needed for dust suppression for approximately 10 percent of the proposed project during construction (i.e., for approximately 36 new well pads and their associated roads, pipeline corridors, and other surface facilities). Therefore, based on this assumption, Newfield would use a total of approximately 3 acre-feet of water for dust suppression during construction activities under the No Action Alternative.

Similarly, water would be needed annually for dust suppression per well pad, associated access road, and pipeline corridor during project operation, again for approximately 10 percent of the proposed project (i.e., for approximately 36 well pads and their associated roads, pipeline corridors, and other surface facilities). Based on these assumptions, implementation of the No Action Alternative would require 5 acre-feet of water per year for dust abatement during project operations.

2.4.4.3 Waterflooding Infrastructure and Operations

Newfield would use waterflooding technology on the 40-acre surface and downhole spaced Green River wells after about the first 3 years of production. A total of approximately 75 to 100 bpd (or approximately 0.01 acre-feet per day) of water would be required for each waterflood injection well. Under the No Action Alternative, Newfield would convert approximately 150 of its proposed wells to injection wells, therefore requiring approximately 1.5 acre-feet of fresh water per day for injection purposes. Based on the requirement of 1.5 acre-feet of water per day, the annual water requirement for waterflooding operations would be approximately 548 acre-feet.

2.4.5 Produced Water Disposal

Under the No Action Alternative, a single water treatment and injection facility would be constructed. Surface disturbance from the proposed water management facility would be approximately 7 acres. In addition, a single pump station would be constructed under the No Action Alternative, disturbing a total of approximately 5 acres.

Although estimated future water production is difficult to predict because of variable water saturation conditions as the oil and gas formations are produced and depleted, it is estimated for purposes of analysis in this EIS that Newfield will recycle all of the water that would be produced under this alternative for use in waterflood operations.

2.4.6 Workforce Requirements

The active workforce needed to implement the No Action Alternative is shown in **Table 2.4.6-1**.

TABLE 2.4.6-1
ESTIMATED WORKFORCE REQUIREMENTS UNDER THE NO ACTION ALTERNATIVE

Work Category	Time Requirements	Number of Facilities	Personnel Required (No. per day)	Workdays for Project	Average Workdays per Year	Average Workers per Day
Construction and Installation						
Access Road	4 days/mile	68 miles	8	2,176	989	5
Well Pad	3 days/site	369	8	8,856	4,025	17
Pipelines	10 days/mile	68 miles	10	6,800	3,091	13
Drilling and Casing	4 days/well	778	8	24,896	11,316	48
Well Completion	4 days/well	778	20	62,240	28,291	118
Well Production	10 days/well	778	16	124,480	56,582	236
Central Facilities	45 days/site	7	20	6,300	2,864	12
Total				**235,748**	**107,158[1]**	**449**
Operation and Maintenance						
Road/Well Pad Maintenance	120 days/year	N/A	3	10,080	360	2
Pumpers	260 days/year	N/A	16	116,480	4,160	18
Office	260 days/year	N/A	2	14,560	520	3
Well Workover	5 days/well	15 per year	2	4,200	150	1
Total				**145,320**	**5,190[2]**	**24**
Reclamation and Abandonment[3]						
Well Pads	3 days/well pad	369	4	4,428	N/A	--
Roads and Pipelines	4 day/mile	68 miles	4	1,088	N/A	--
Central Facilities	30 day/facility	7	16	3,360	N/A	--
Total				**13,784**	--	--

[1] Based on a 2.2-year construction schedule

[2] Based on a 28-year construction, production, and operation schedule.

[3] Includes interim reclamation.

2.5 ALTERNATIVE C – FIELD-WIDE ELECTRIFICATION

This alternative was developed in response to air quality issues raised during the public and agency scoping process. The principal component of this alternative entails a phased field-wide electrification system that

would be integrated in the MBPA over an estimated seven-year period. This alternative would incorporate the same construction and operational components described in **Section 2.2**, except that gas-driven motors would be converted to electric motors as field electrification is phased into the MBPA.

Under Alternative C, the same number of oil and gas wells (5,750) would be developed on BLM, State, and private lands as described under the Proposed Action. Under this drilling scenario, construction, drilling, and completion of all 5,750 wells would occur for approximately 16 years. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated LOP under Alternative C would be 41 to 51 years. Conceptual locations for the approximately 5,750 wells, well pads, and other surface facilities are illustrated on **Figure 2-3 (Attachment 1)**.

Alternative C includes the following primary components (see **Figure 2-3 – Attachment 1**):

- Development of up to 750 new Green River oil well pads and vertical wells on 40-acre surface density and downhole spacing, all of which would be converted into waterflood injection wells after approximately 3 years of production;
- Development of up to 2,500 new Green River oil wells on 20-acre downhole spacing that would be directionally drilled from existing or the above-described new well pads, consistent with current State spacing requirements;
- Development of up to 2,500 new deep gas well pads and vertical wells on 40-acre surface density and downhole spacing that would be drilled from new 3-acre well pads, which would be constructed adjacent to Green River oil well pads to reduce new surface disturbance and use existing utility infrastructure and access roads;
- Construction of approximately 243 miles of new 150-foot-wide ROW that would be used for new road construction (40-foot width), pipeline installation (60-foot width), and distribution line construction (50-foot width). Up to 150-foot-wide expansion along approximately 363 miles of existing access road ROW that would be used for road upgrade (40-foot width), pipeline installation (60-foot width), and distribution line construction (50-foot width);
- Construction of 20 new compressor stations for deep gas well development;
- Expansion of three existing Green River oil well compressor stations and construction of one new compressor station for gas associated with Green River oil well development;
- Construction of a 50 MMscf/d centralized gas processing plant;
- Construction of seven new and expansion of six existing water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of up to 12 GOSPs for oil and produced water collection;
- Development of one fresh water collector well for waterflood operations;
- Construction of six water pump stations; and
- Phased field-wide electrification consisting of construction of approximately 35 miles of overhead, cross-country 69kV transmission line (pole line), 156 miles of distribution lines, and 11 generating stations (also known as substations).

Surface disturbance anticipated under Alternative C is shown in **Table 2.5.1-1**. Initial surface disturbance would occur during and immediately after the construction, drilling, completion, and testing activities.

Prior to interim reclamation, initial surface disturbance for well pads, access roads, pipeline ROWs, and other surface facilities would equal approximately 20,112 acres. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within two to three growing seasons, assuming optimal conditions are present. The remaining surface disturbance would be residual or "long-term" disturbance of approximately 10,173 acres for the 41- to 51-year LOP.

Specific details of construction-related activities and specific design features for the construction of well pads and roads, pipelines, compressor stations, GOSPs, and pump stations; well drilling and completion; production, operations, and maintenance activities; water requirements; produced water disposal; final reclamation and abandonment; and hazardous materials and solid waste for Alternative C are identical to those previously described under the Proposed Action, and will not be repeated further in this section. Specific details of project activities, design features, and surface disturbance summaries that are unique to Alternative C are described below in the following sections.

2.5.1 Alternative Specific Activities

2.5.1.1 Phased Field-wide Electrification

Under Alternative C, a phased field-wide electrification system would be integrated in the MBPA. Installation would begin following project approval and would be completed over an estimated 7 years. Electrification would be used to power pumps at water treatment and injection facilities, pumps and heaters at GOSPs, compressors at central facilities, and separators and pump jacks at well site facilities.

Up to 11 generating stations (also known as substations) would be constructed in the MBPA, and each would be fueled by natural gas that is extracted within the MBPA. Each generating station would consist of two 20-megawatt of electricity (MWe) gas turbine generators and one 10-MWe steam turbine generators capable of generating a combined 50 megawatts (MW) of power.

Each new generating station would occupy a site approximately 5 acres: therefore, the surface disturbance resulting from the construction of proposed generating stations within the MBPA would be approximately 55 acres. The combined total generating capacity of these facilities within the MBPA would be approximately 550 MW of power. As with other central facilities, initial surface disturbance associated with the construction of generating stations would not be reclaimed during interim reclamation, because the entire disturbed area would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 55 acres.

Each generating station would connect with overhead transmission lines to the other stations so as to provide a redundant power supply. While it is anticipated that excess electricity would be generated, it is unlikely that this electricity would be sold back to the grid, due to the limitations in obtaining new power purchase agreements with existing utilities.

Transmission lines would run cross-country and would be installed in a 60-foot-wide construction ROW with a long-term, 60-foot maintenance/inspection ROW. Approximately 35 miles of transmission lines would be installed along a 60-foot-wide disturbance corridor. Therefore, the initial and long-term surface disturbance resulting from installation of the proposed transmission lines would be approximately 255 acres.

TABLE 2.5.1-1
SURFACE DISTURBANCE UNDER ALTERNATIVE C

Project Feature	Size (disturbance width [feet] or acres/facility)	Federal Lands			State Lands			Private Lands			Project Total		
		Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]	Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]
Well Pads													
New Green River Oil Well Pads and Vertical Wells on 40-Acre Surface Density and Downhole Spacing	2.0 acres per well pad	632	1,264	632	86	172	86	32	64	32	750	1,500	750
New Green River Oil Wells on 20-acre Downhole Spacing Directionally Drilled from Existing or the above New Well Pads	0.2 acre per well	2,135	427	427	300	60	60	65	13	13	2,500	500	500
New Deep Gas Well Pads and Vertical Wells on 40-Acre Surface Density and Downhole Spacing	3.0 acres per well pad	2,135	6,405	2,135	300	900	300	65	195	65	2,500	7,500	2,500
Subtotal	--	**4,902**	**8,096**	**3,194**	**686**	**1,132**	**446**	**162**	**272**	**110**	**5,750**	**9,500**	**3,750**
Total Number of New Well Pads	--	**2,767**	--	--	**386**	--	--	**97**	--	--	**3,250**	--	--
Access Roads													
New Roads Co-located with Pipelines	40 feet[2]	208 miles	1,008	1,008	31 miles	150	150	4 miles	19	19	243 miles	1,178	1,178
Existing Roads Co-located with New Pipelines	10 feet[3]	311 miles	377	377	34 miles	41	41	18 miles	22	22	363 miles	440	440
Subtotal	--	**519 miles**	**1,385**	**1,385**	**65 miles**	**192**	**192**	**22 miles**	**41**	**41**	**606 miles**	**1,618**	**1,618**
Pipelines													
Pipelines Co-located with New Roads	60 feet[4]	208 miles	1,513	630	31 miles	225	94	4 miles	29	12	243 miles	1,767	736[5]
Pipelines Co-located with Existing Roads	60 feet[4]	311 miles	2,262	942	34 miles	247	103	18 miles	131	55	363 miles	2,640	1,100[5]
Transmission Lines	60 feet	28 miles	203	203	2 miles	15	15	5 miles	29	29	35 miles	255	255
Distribution Lines	50 feet	519 miles	3145	3145	65 miles	394	394	22 miles	133	133	606 miles	3672	3672
Subtotal	--	**546 miles**	**3,874**	**1,622**	**67 miles**	**480**	**201**	**27 miles**	**178**	**76**	**796 miles**	**8334**	**5673**
Central Facilities													
Compressor Stations (New and Upgrades)	9.4 acres	21	197	197	3	28	28	0	0	0	24	226	226
Gas Processing Plants	10.0 acres	0	0	0	1	10	10	0	0	0	1	10	10
Water Treatment and Injection Facilities	8/5 acres[7]	12	78	78	1	8	8	0	0	0	13[8]	86	86
Gas and Oil Separation Plants (GOSPs)	22.0 acres	10	220	220	2	44	44	0	0	0	12	264	264
Fresh Water Collector Well	1.7 acre	1	0	0	0	0	0	0	0	0	1	1.7	.7
Pump Stations	3.0 acres	5	15	15	0	0	0	1	3	3	6	18	18
Generating Stations (Substations)	5.0 acres	10	50	50	1	5	5	0	0	0	11	55	55
Subtotal	--	**59**	**560**	**560**	**9**	**95**	**95**	**1**	**3**	**3**	**68**	**659**	**659**
Total New Disturbance	--	--	**13,915**	**6,761**	--	**1,899**	**934**	--	**494**	**230**	--	**20,112**	**10,173**

Source Note: Project totals for wells, miles of roads/pipelines, and numbers of facilities have been broken down by federal, state and private surface land categories for analysis purposes only. These totals represent an estimate based on conceptual locations of surface facilities and infrastructure.

[1] Residual disturbance calculations are based on the assumption that interim reclamation will be initiated and successful.

[2] Initial disturbance assumes that a 150-foot wide disturbance corridor would be needed for construction, of which 40 feet would be used for new road construction, 60 feet for pipeline/utility line installation and 50 feet for distribution lines.

[3] Initial disturbance assumes that a 120-foot wide disturbance corridor would be needed for construction, of which 10 feet would be used for general road improvements, 60 feet for pipeline/utility line installation and 50 feet for distribution lines.

[4] Initial disturbance assumes that a 60-foot wide disturbance corridor would be needed for pipeline/utility line installation within new and existing road ROWs.

[5] Residual disturbance assumes a 75-foot ROW; 25 feet of the un-reclaimed road/pipeline corridor, and 50 feet for distribution lines.

[6] Proposed distribution lines would be co-located within road and pipeline ROWs and have an additional 50-foot wide corridor.

[7] Includes six new and six expanded water treatment and injection facilities.

[8] Each new water treatment and injection facility would occupy a site approximately 8 acres in size. Existing water treatment and injection facility locations proposed for expansion would be increased in size by approximately 5 acres each.

A series of overhead or buried distribution lines would carry electricity from transmission lines to central facilities located on individual well pads. Distribution lines would require an initial and long-term 50-foot-wide disturbance and maintenance corridor.

Surface facilities along power lines would consist of the following features:

- Transmission lines would be built on single tubular steel poles with a span of approximately 600 feet between the poles.
- Above ground distribution lines would be built on a mix of tubular steel and single wood utility poles approximately 65 feet tall. The span between poles would be approximately 300 feet for wooden poles and 600 feet for tubular steel poles.
- Buried distribution lines would be aluminum 3-1/C cable installed with ground and junction boxes, as needed.

Electrification of the MBPA would take approximately 7 years to complete. Consequently, under this alternative, gas-fired engines would be used for operational field equipment until the electrification process is complete. Equipment needed for electrification is listed in **Table 2.5.1-1.**

2.5.1.2 Interim Reclamation

Under Alternative C, approximately 50 percent of initial disturbance associated with construction of proposed well pads, road and pipeline ROWs, and other project facilities not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of Alternative C to approximately 10,173 acres.

TABLE 2.5.1-1
SURFACE EQUIPMENT REQUIRED FOR FIELD-WIDE ELECTRIFICATION

Surface Facility	Surface Equipment Per Facility/Pad
Primary Substation/Generation Zone	• Four, 25-MWe gas turbine generators; • Two, 10-MWe steam turbines; • One water softening plant
Well Pads	• One 100 kVA, 24.5 kV-480V pole mount or pad mount transformer; • One 480V, 225Amp Bus rating, NEMA 4X Outdoor Rated Low Voltage Motor Control center; • One 480V, 40-hp rated, Well Pump Motor Soft Starter; and • One 480V, 100 Amp Bus Rated, Heat Trace Panel
Compressor Stations	• One 30-foot X 14-foot Power Distribution Center Building; • One 5000 kVA, 24.5-4.16 kV pad mount transformer; • One 500 kVA, 4160-480V pad mount transformer; • One 4160V, 1200 Amp Bus Rating, Low Voltage Motor Control Center; and • Small electrical transformer and distribution power for building and site lighting and other miscellaneous loads
Gas Processing Plant	• One 30-foot X 14-foot Power Distribution Center Building; • One 1000 kVA, 24.5-4.16 kV pad mount transformer; • One 150 kVA, 4160-480V pad mount transformer; • One 4160V, 1200 Amp Bus Rating, Medium Voltage Controller; • 600 Amp Bus Rating, Low Voltage Motor Control Center; and

Surface Facility	Surface Equipment Per Facility/Pad
	• Small electrical transformer and distribution power for building and site lighting and other miscellaneous loads.
Water Treatment and Injection Facility	• One 24-foot X 12-foot Power Distribution Center Building; and • One 2000 kVA, 24.5-4.16 kV pad mount transformer.
GOSPs	• One 24-foot X 12-foot Power Distribution Center Building; • One 1500 kVA, 24.5-480V pad mount transformer; • One 480V, 2000 Amp Bus Rating, Low Voltage Motor Control center; and • Small electrical transformer and distribution power for building and site lighting and other miscellaneous loads.

2.5.3 Workforce Requirements

The active workforce needed for development of Alternative C is estimated in **Table 2.5.3-1**.

TABLE 2.5.3-1
ESTIMATED WORKFORCE REQUIREMENTS UNDER ALTERNATIVE C

Work Category	Time Requirements	Number of Facilities	Personnel Required (No. per day)	Workdays for Project	Average Workdays per Year	Average Workers per Day
Construction and Installation						
Access Road	4 days/mile	606 miles	8	19,392	1,212	5
Well Pad	3 days/site	3,250	8	78,000	4,875	20
Pipelines, Transmission and Distribution Lines	10 days/mile	796 miles	10	79,600	4,975	21
Drilling and Casing	4 days/well	5,750	8	184,000	11,500	48
Well Completion	4 days/well	5,750	20	460,000	28,750	120
Well Production	10 days/well	5,750	16	920,000	57,500	240
Central Facilities	45 days/site	68	20	61,200	3,825	16
Total				**1,802,192[1]**	**112,637**	**470**
Operation and Maintenance						
Road/Well Pad Maintenance	120 days/year	N/A	3	12,600	360	2
Pumpers	260 days/year	N/A	36	327,600	9,360	39
Office	260 days/year	N/A	4	36,400	1,040	4
Well Workover	5 days/well	30 per year	2	10,500	300	1
Total				**387,100[2]**	**11,060**	**46**

Work Category	Time Requirements	Number of Facilities	Personnel Required (No. per day)	Workdays for Project	Average Workdays per Year	Average Workers per Day
Reclamation and Abandonment[3]						
Well Pads	3 days/well pad	5,750	4	69,000	N/A	--
Roads, Utility Lines and Pipelines	4 day/mile	606 miles	4	9,696	N/A	--
Central Facilities	30 day/facility	68	16	32,640	N/A	--
Total				**111,336**	--	--

[1] Based on a 16-year construction schedule.
[2] Based on a 35-year construction, production, and operation schedule.
[3] Includes interim reclamation.

2.6 ALTERNATIVE D –AGENCY PREFERRED ALTERNATIVE

In accordance with CEQ regulations, the BLM is required to identify a preferred alternative in the EIS if one or more exists. Alternative D, the Resource Protection Alternative, is the Agency Preferred Alternative. Alternative D was developed to respond to issues raised during scoping about reducing potential impacts to sensitive resource and land uses. The parameters of this alternative were adjusted between the Draft EIS and the Final EIS in response to technical issues raised during the public comment period, which were not considered when the alternative was originally being designed. The data provided during the comment period regarding these technical issues was reviewed by BLM engineers and was determined to be largely accurate. The impact of these technical issues to the proponent's ability to diligently and efficiently develop oil and gas resources in the Project Area as required by regulation and the terms of their leases was significant. Therefore, the BLM determined adjustments to the agency preferred alternative were necessary and in conformance with the purpose and need for this EIS. The alternative adjustments are all contained within the range of alternatives considered in the Draft EIS, so it was determined that a Supplement to the Draft EIS was not necessary.

For the MBPA, the primary objective of the Resource Protection Alternative is to meet the purpose and need for the Project while 1) protecting the relevant and important values of the Pariette Wetlands Area of Critical Environmental Concern (ACEC); 2) minimizing the amount of new surface disturbance and habitat fragmentation within and around USFWS proposed Level 1 and 2 Core Conservation Areas (for two federally-listed plant species: the Uinta Basin hookless cactus [*Sclerocactus wetlandicus*] and the Pariette cactus [*Sclerocactus brevispinus*]); 3) precluding new well pads (with the exception of Newfield's proposed water collector well) and minimizing new surface disturbance (roads or pipelines) within 100-year floodplains; 4) precluding new well pads, pipelines, or roads within riparian habitats; and 5) minimizing overall impacts from the proposed oil and gas development through the use of directional drilling technology. **Figure 2-4 (Attachment 1)** depicts the location of the ACEC and Core Conservation Areas in the MBPA. **Figure 3.6.3.2-1 (Attachment 1)** depicts the location of the 100-year floodplains in the MBPA.

Advancements in directional drilling technology have increased the maximum vertical section displacement for the shallow Green River Formation to distances of 800 to 1,200 feet though significant technical and

economic challenges are encountered in those wells (increased equipment wear and tear resulting in more frequent workover or replacement cycles and associated increased costs, and reduction in areal waterflood sweep).

2.6.1 Pariette Wetlands ACEC

Under Alternative D, the areas where the ACEC relevant and important values (special status bird and plant habitat, wetlands ecosystem) occur would be protected as described in **Sections 2.6.1.1 100-Year Floodplains and Riparian Areas**, **2.6.1.2 Special Status Species**, and **2.6.2 Cactus Core Conservation Areas**. In the remainder of the ACEC, new or expanded well pads could be built following the low density development guidance described in **Section 2.6.3** and subject to the restrictions described below, so long as surface disturbance is minimized to the extent possible and no impacts occur to the relevant and important values. In those cases, site-specific NEPA assessments would be completed to facilitate avoidance of impacts to relevant and important values.

2.6.1.1 100-Year Floodplains, Riparian Areas, and other Water Resources

Under Alternative D:

- No surface disturbance would occur within 500 feet of Pariette Creek or Pariette ponds.
- No new well pad-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas.
- No new pipeline- or road-related surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas, unless there are no practical alternatives or the action is designed to enhance the riparian resources. Unavoidable impacts would be fully mitigated.
- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads would be set back a minimum of 200 feet from the active stream channel (average 3 feet wide or greater without an associated riparian zone) unless site-specific analysis demonstrates that:
    - 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain,
    - 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or
    - 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood.
        - In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.
- Pipelines that cross or are within 100-year floodplains will either be elevated above the predicted 100-year flood event on a pipe bridge, or buried at least 5 feet below the channel bottom or below the predicted scour depth for an equivalent flood event (whichever is deeper) and in conformance with hydrological design practices.
- Pipelines that cross stream channels will incorporate a sediment retention system along the construction corridor to minimize movement of sediment into the water courses. These could range from silt fencing and culverts to sediment retention basins, depending on the location.
- Newfield will utilize the applicable USFWS BMPs for work in Utah streams where pipelines or roads cross a stream.
- Newfield will utilize BLM Hydraulic Considerations for Pipeline Crossings of Stream Channels (prepared by the Utah State Office BLM, Salt Lake City, Utah).
- Road crossings of drainages will be built to accommodate the 100-year flood, typically using at-grade crossings rather than culverts. Crossings will be designed so they will not cause siltation or

accumulation of debris, nor will the roadbed block the drainage. Any culverts used will be designed and constructed to allow passage of aquatic species.

- As determined necessary on a site-specific basis (based on proximity to a 100-year floodplain), wells with the potential to contaminate surface waters will have automatic shutoff valves.
- Any pipeline conveying produced water or other industrial liquid across the 100-year floodplains as conceptually depicted in FEIS Figure 3.6.3.2-1 would be provided with shut-off valves immediately outside the 100-year floodplain on both sides of the crossing.
- Storage and parking locations for hazardous materials, lubricants, fuel tanks or trucks, and refueling activities would be a minimum distance of 100 meters from wetlands, riparian areas, and channels with defined bed and banks. Such materials storage or refueling activities would be outside the 100-year floodplains as depicted in FEIS Figure 3.6.2.3-1.
- Flow monitors would be installed on produced water pipelines to detect possible leaks. If any of the following impacts are observed, the adaptive management mitigation identified in the long term water monitoring plan (see Appendix H) will be implemented:
  - Increased sedimentation;
  - Increased concentrations of inorganic constituents, including metals;
  - Increased concentrations of selenium, boron, or total dissolved solids;
  - Contamination with petroleum and other organic constituents;
  - Reduction of spring flows; and/or,
  - Reduction of water levels in wells.

2.6.1.2 Special Status Species

In addition to the fish and wildlife ACEPMs listed in **Section 2.2.12.7**, and the guidance for development in *Sclerocactus* Core Conservation Areas (**Section 2.6.2**) the following measures would be implemented under Alternative D:

- Additional *Sclerocactus* Design Features:
  - The Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus for the Newfield Greater Monument Butte Project (Appendix J - Biological Assessment - Attachment F) developed by FWS and Newfield will be implemented under this Alternative.
  - Surveys will be completed by a qualified botanist in potential *Sclerocactus* habitat prior to BLM's consideration of any surface disturbing activities, in accordance with the latest conservation measures and FWS protocols and Memorandums of Understanding.
  - BLM's priority will be to locate any new surface disturbance more than 300 feet from *Sclerocactus* populations or individuals, except for surface pipelines, which is 50 feet.
  - When the edge of an unavoidable surface disturbance (unavoidable surface disturbance for this document is defined as a buried pipeline adjacent to an existing road or a well pad expansion[4]) is located within 300 feet of populations or individuals of *Sclerocactus*, the following actions will be taken to minimize the impacts:

[4] In limited cases as defined in the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (Appendix J Biological Assessment - Attachment F) it may be possible to install a new well pad and road within 300 feet of cactus.

- Pad expansion construction or pipeline installation work would occur outside the flowering period (March 15 to June 30).
- All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.
- Erosion control methods (e.g., silt fencing) will be used to protect cacti that are within 300 feet and down slope or downwind of surface disturbance and should only be implemented within the area proposed for surface disturbance. Fencing is intended to prevent sedimentation or dust deposition and will be evaluated for effectiveness by a qualified botanist.
- A qualified botanist will be on site to monitor surface-disturbing activities when cacti are within 300 feet of any surface disturbance.
- Dust abatement will occur over the life of the project on disturbed surfaces in suitable habitat where plants are closer than 300 feet to surface disturbing activities, during the time of year when the species is most vulnerable to dust-related impacts (March to August). Abatement will be designed to minimize potential for dust plume generation and will use water only.
- Cacti within 300 feet of a proposed surface disturbance will be flagged immediately prior to surface-disturbing activities, and flags will be removed immediately after surface-disturbing activities are completed. Leaving cacti flagged for as short a time as possible will minimize drawing attention to the cacti and reduce the potential for theft;
- New pipelines will be sited to maximize the distance from adjacent *Sclerocactus wetlandicus, S. brevispinus*, and hybrids.
- Surface pipelines placed closer than 50 feet of individuals or populations will be secured to prevent pipeline movement.
- Project personnel associated with construction activities will be instructed to drive at a speed limit of 15 miles per hour on unpaved roads and to remain on the existing roads and ROWs at all times.
- Noxious weeds may be controlled with herbicides in accordance with BLM policy. However, weed control methods within 50 feet of individuals and populations would include provisions for mechanical removal, as opposed to chemical.
- A monetary amount, as calculated by the USFWS, will be contributed to the *Sclerocactus* Mitigation Fund to aid in the recovery of Sclerocactus species impacted by the project.
- Native plants will be seeded according to BLM's reclamation guidelines.
- All crews will be informed of potential Sclerocactus presence, identification, and legal repercussions associated with "take' of a listed species.
- If a spill occurs within the SclerocactusT&E potential, critical, or core habitats polygon, Newfield would provide a copy of the official spill report to USFWS within the same timeframe required by the regulatory agency.
- Initial pre-disturbance 100% clearance surveys will be conducted following standard methodology and will be valid for a period of 4 years.

- If more than 4 years pass between the original surveys and construction, a new 100% clearance survey will be required.
- If construction is to occur within the 4 year window, an additional, reduced-effort "spot check" survey will be conducted following the below methodology in the year of project construction.

2.6.2 Cactus Core Conservation Areas[i]

Under Alternative D, the following measures, based on USFWS' management guidelines and recommended protection of Core Conservation Areas would be implemented to minimize the effects of energy development on *Sclerocactus* habitat. (See **Appendix I.**) Two levels of core conservation areas would be used to manage development in relation to cactus core habitat (see **Figure 2-4 (Attachment 1))**. The following definitions are pertinent to this portion of Alternative D:

- Actions that occur entirely within previously disturbed areas (such as reopening reserve pits so long as the spoils do not disperse onto adjacent undisturbed areas or burying pipelines in existing roads), are not considered "new" surface disturbance.
- Temporary use areas (areas that are outside of the current edge of disturbance, i.e. outside reclaimed reserve pits, that would be used to erect and disassemble the drilling derrick) are considered "new" surface disturbance.
- BLM designated plugged and abandoned wells (P&A) for purposes of this EIS are considered by the BLM to be fully reclaimed but are given preference for construction of new well pads over previously undisturbed areas.
  - A well that is BLM P&A status has had a Final Abandonment Notice (FAN) submitted by the company, and accepted by the BLM (this definition differs from the P&A definition for the State of Utah, which defines P&A as the well is plugged but the location is not reclaimed). The acceptance of a FAN by the BLM documents the compliance of the company with the BLM's then-in-force reclamation standards and the release of the company from obligation regarding future problems with the well (release of the bond). If problems with the reclamation of a P&A well are identified by the BLM after the FAN is accepted, then the BLM is responsible for any remedial actions.

2.6.2.1 Level 1 Core Conservation Areas

In Level 1 areas, which are 400-meter buffer zones around high plant density populations, surface disturbance would be avoided to the greatest extent practicable by using existing infrastructure (i.e., access roads and pipelines) and directional drilling from multi-well pads. In addition, the following conditions would apply:

- New wells could be directionally drilled from existing well pads, and new pipelines could be installed in existing roads so long as no new surface disturbance is required.
- No new well pads would be allowed except as allowed under the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (Appendix J Biological Assessment - Attachment F). In limited cases, well pad expansions could occur and new pipelines could be installed directly adjacent to existing roads so long as new surface

disturbance is minimized, use of existing disturbance is maximized, the appropriate mitigation from **Section 2.6.1.2** is applied, and a monetary amount (determined by the USFWS) is contributed to the *Sclerocactus* mitigation fund.

One of the goals of Alternative D is to prevent new surface disturbance within Level 1 Core Conservation Areas. However, site-specific conditions may necessitate the creation or expansion of well pads to facilitate the waterflood program to fully recover the mineral resource. In those cases, site-specific NEPA assessments would be completed, reinitiation of consultation would occur as needed, and site-specific mitigation measures would be applied.

2.6.2.2 Level 2 Core Conservation Areas

In Level 2 areas, which are 1,000-meter buffer zones around but not including the Level 1 areas, surface disturbance would be minimized to the greatest extent practicable by using existing infrastructure (i.e., access roads and pipelines) and directional drilling from multi-well pads. Under Alternative D there would effectively be two possible drilling scenarios in Level 2 Core Conservation Areas, with Scenario 1 being BLM's preferred choice:

- Scenario 1) New wells could be directionally drilled from existing well pads, and new pipelines could be installed in existing roads so long as no new surface disturbance is required.
- Scenario 2) New surface disturbance would be allowed as described below, so long as new and existing surface disturbance would not exceed the 5% disturbance cap recommended in the Draft Management Guidelines for the Core Conservation Areas (Appendix I) except as allowed under the FWS/Newfield Conservation, Restoration, and Mitigation Strategy for the Pariette and Uinta Basin Hookless Cactus (Appendix J – Biological Assessment Attachment F)..
  - New well pads would be allowed in areas where the mineral resource can't be reached from existing pads or to accommodate deep gas drilling; and
  - Well pad expansions to accommodate additional wells, and buried pipeline installation directly adjacent to existing roads to accommodate conversion of existing producing wells to injection, would be permitted so long as the new surface disturbance is minimized, use of existing disturbance is maximized, and the appropriate mitigation from Section 2.6.1.2 is applied.
    - In sections where existing well pads exceed four pads per section, no new well pads would be allowed, unless reclamation of current pads occurs so that the total existing plus new well pad count is four per section.
  - Well pad expansions to accommodate additional wells, and buried pipeline installation directly adjacent to existing roads to accommodate conversion of existing producing wells to injection, would be permitted so long as the new surface disturbance is minimized, and the appropriate mitigation from **Section 2.6.1.2** is applied.

2.6.3 New Development Based on Existing Well Density (In Areas Outside ACEC and CCAs)

An additional goal of Alternative D is to reduce the amount of surface disturbance from the proposed project in areas outside the Pariette Wetlands ACEC and Core Conservation Areas by reducing the size of new

wells pads[5], reclaiming areas of existing disturbance, and increasing the use of multi-well pads. Therefore, under this alternative, numerous existing single-well pads would be converted to a complex of multi-well, directional drilling pads and waterflood injection wells, which would have a lower overall disturbance in comparison to the Proposed Action and Alternative C.

As discussed in Section 2.2**, Figure 2.6-1 (Attachment 1)** shows the existing high- and low-density development areas within the MBPA. High-density development areas are those areas that already have from six to 16 well pads per 640-acre section (i.e., one well pad per 40 to 106 acres). Low-density development areas are defined as those areas that have had no development at all or contain up to five well pads per section.

Of the 197 sections or portions of sections within the MBPA, 115 (about 58 percent) are within high-density development areas. Average existing surface disturbance within the high-density development areas is 39.0 acres per section, and the average number of existing well pads per section is 14.3. Approximately 82 sections or portions of sections occur within the low-density development areas. The average existing disturbance within the low-density development areas is 11.9 acres per section, and the average number of existing well pads per section is 2.8.

Within high-density development areas, four large, existing well pads per section could be expanded by about 0.2 to 0.8 acres per new well (anticipated to be up to six wells per existing pad, consisting of one existing vertical 40-ac oil/injection one new directional 20-ac oil one new vertical deep gas; and three new directional deep gas). Additionally, within high-density development areas, 12 small well pads per section could be expanded by about 0.2 acres per well to accommodate one new directional 20-ac oil well (i.e., each existing well pad is anticipated to contain up to two wells, consisting of one existing vertical 40-ac oil/injection and one new directional 20-ac oil). Based on GIS calculations of the conceptual number of locations available for construction and drilling in the Project Area using the design parameters discussed above, locations for new wells are available in excess of the number of wells proposed to be drilled under the Proposed Action. However, for analysis purposes the total numbers of wells assumed to be drilled under this alternative would not exceed the number proposed under the Proposed Action.

For analysis purposes, it is assumed that existing well pads would be reclaimed back to be a minimum of 1 acre per pad. Under this scenario, the existing pads, with an average size of 2 acres each (or 24 acres total), would be reclaimed down to approximately 1 acre each, which is the average area of disturbance needed to accommodate safe operation of a workover rig and crew when well maintenance or re-completion on the waterflood injection well is required. Therefore, an average of 1 acre would be reclaimed for each existing well pad. This equates to 16 acres per section (for 16 wells), which would result in a substantial decrease in the residual or long-term amount of surface disturbance within the MBPA compared to the other action alternatives (see **Table 2-7**).

For low-density development areas with zero to five existing well pads per section, the proposed surface density would be no more than four large, new well pads per 640-acre section (i.e., one large well pad per 160 acres) and twelve small, new well pads per 640-acre section (i.e., three small well pads per 160 acres). See **Figure 2.6-2B (Attachment 1)** for a graphical representation of this alternative as compared to the

[5] The DEIS agency preferred alternative focused on reducing the number of new well pads. Based on public comment on technical limitations of waterflood operations, the focus of the EIS has shifted to reduce the size of well pads in high and low density areas. However, under the revised agency preferred alternative the anticipated number of well pads is still substantially lower than those expected under the Proposed Action.

Proposed Action. There would be no restriction on the number of wells that could be drilled from those well pads, provided that the wells conform to UDOGM downhole spacing requirements, which is currently 20 acres. For purposes of impact analysis, it is assumed that the large well pads would each accommodate one vertical deep gas well, three directional deep gas wells, one vertical 40-acre oil well which would then be converted to an injection well after about two years of production, and one directional 20-acre oil well. It is also assumed that the twelve small well pads would each accommodate one 40-acre vertical oil well which would then be converted to an injection well, and one 20-acre directional oil well. However, for purposes of impact analysis, it is assumed that total well counts for oil and gas wells would not exceed that evaluated under the Proposed Action. Based on GIS calculations of the conceptual number of locations available for construction and drilling in the project area using the design parameters discussed above, locations for new wells are available in excess of the number of wells proposed to be drilled under the proposed action. However, the total numbers of wells to be drilled under this alternative would not exceed the number proposed under the Proposed Action. For analysis purposes it is assumed that new well pads would be reclaimed back to a minimum of 1 acre per pad for production.

This alternative would incorporate the same construction and operational components as the Proposed Action and Alternative C, but with fewer new well pad locations and a substantially greater number of multiple, directional wells drilled from a combination of new and existing well pads. While the configuration of types and numbers of wells per well pad would be developed based on the information in the preceding sections, total well counts would not exceed those evaluated under the Proposed Action. Therefore, under Alternative D, approximately 5,750 oil and gas wells would be developed on BLM, State, and private lands in the MBPA from up to 1,245 new well pads and 1,538 existing well pads. Newfield would drill associated wells at an average rate of 360 wells per year. Under this drilling scenario, construction, drilling, and completion of all 5,750 wells would occur for approximately 16 years. The total number of wells drilled would depend largely on outside factors such as production success, engineering technology, reservoir characteristics, economic factors, commodity prices, rig availability, and lease stipulations. The anticipated life of an individual well is 20 to 30 years, and the anticipated time it would take for field abandonment and final reclamation is 5 years. Therefore, the anticipated LOP under Alternative D would be 41 to 51 years. Conceptual locations for the proposed well pads and other surface facilities are illustrated on **Figure 2-4 (Attachment 1)**.

Alternative D includes the following primary components (see **Figure 2-4 – Attachment 1**):

- Development of approximately 750 new Green River vertical oil wells to be drilled from a combination of new, small and large well pads, all of which would eventually be converted into waterflood injection wells;
- Development of approximately 2,500 new deep gas wells that would be vertically or directionally drilled from a combination of new and existing, large well pads;
- Development of approximately 2,500 new 20-acre downhole spacing Green River oil production wells to be directionally drilled from a combination of new or existing, small and large well pads.
- Construction of approximately 226 miles of new 100-foot-wide ROW that would be used for new road construction (40-foot width) and pipeline installation (60-foot width). Up to 70-foot-wide expansion along approximately 318 miles of existing access road ROW that would be used for road upgrade (10-foot width) and pipeline installation (60-foot width);
- Construction of 20 new compressor stations for deep gas well development;
- Expansion of three existing Green River oil well compressor stations and construction of one new compressor station for gas associated with Green River oil well development;
- Construction of up to one 50-MMscf/d centralized Green River oil well gas processing plant;

- Construction of up to 13 gas driven water treatment and injection facilities for management and distribution and injection of produced water;
- Construction of up to 12 GOSPs for oil and produced water collection;
- Development of one fresh water collector well for waterflood operations; and
- Construction of six water pump stations.

Surface disturbance anticipated under Alternative D is shown in **Table 2.6.3-1**. Initial surface disturbance would occur during and after the construction, drilling, completion, and testing activities. Prior to interim reclamation, initial surface disturbance for well pads, access roads, pipeline ROWs, and other surface facilities would equal approximately 10,122 acres. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within two to three growing seasons, assuming optimal conditions are present. The remaining surface disturbance would be residual or "long-term" disturbance of approximately 4,978 acres during the LOP.

Specific details of construction-related activities and specific design features for well completion; production, operations, and maintenance activities; final reclamation and abandonment; and hazardous materials and solid waste under the Alternative D are similar to those previously described in **Section 2.2**, *Development Activities Common to All Action Alternatives,* and will not be repeated further in this section. Specific details of project activities, specific design features, and surface disturbance summaries that are unique to Alternative D are described in the following sections.

2.6.4 Alternative-specific Activities

2.6.4.1 Well Pad Construction

As previously discussed, one of the primary goals of Alternative D is to reduce surface disturbance. As a result, the alternative includes enhanced use of existing well pads, as well as increased use of directional drilling from new and existing pads. Under this scenario, Newfield could expand approximately 497 existing, large well pads, and 1,041 existing, small well pads. Newfield could also construct approximately 240 new, large well pads, and 1,005 new, small well pads. If all of these pads were expanded/constructed in accordance with the well development scenario discussed in **Section 2.6.3**, initial disturbance from well pad construction could be up to 4,078 acres. Following well completion(s), portions of the well pad not needed for production would be reseeded and reclaimed according to specifications of the appropriate SMA. Assuming successful interim reclamation, long-term well pad disturbance under Alternative D would be reduced to approximately 1,245 acres.

2.6.4.2 Access Road Construction

Implementation of Alternative D would require the construction of up to 226 miles of new access roads and expansion and/or upgrades to approximately 318 miles of existing roads. ROWs and surface corridor widths for roads under Alternative D would be consistent with activities previously described for the Proposed Action (see **Section 2.3.1.2**). The initial surface disturbance resulting from the construction of new access roads and expansion and/or upgrades to existing roads would be approximately 1,096 acres and 385 acres, respectively.

TABLE 2.6.3-1
SURFACE DISTURBANCE UNDER ALTERNATIVE D

Project Feature	Size (disturbance width [feet] or acres/facility)	Federal Lands			State Lands			Private Lands			Project Total		
		Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]	Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]
Well Pads / Wells ***(Note: This table reflects GIS calculations of the conceptual number of locations available for construction and drilling in the project area based on the design parameters discussed in Section 2.6.3. Surface disturbance for well pads is based on the number of wells that could be drilled from each pad based on the design parameters discussed in Section 2.6.3. Although locations are available in excess of those proposed to be drilled under the proposed action, the total numbers of wells assumed to be drilled under this alternative would not exceed those evaluated under the Proposed Action. As such, well pad surface disturbance in this table is likely an overestimate.)***													
497 Existing, Large Well Pads													
Existing 40-ac Spacing Vertical Wells Located on Existing, Large Well Pads	--	432 existing pads	--	432	50 existing pads	--	50	15 existing pads	--	15	497 existing pads	--	-
New Vertical Gas Wells Located on Existing, Large Well Pads	0.8 acres per well	432 new wells	--	--	50 new wells	--	--	15 new wells		--	497 new wells	398	--
New Directional Gas Wells Located on Existing, Large Well Pads	0.2 acres per well	1,296 new wells	259	--	150 new wells	30	--	45 new wells	9	--	1,491 new wells	298	--
New 20-ac Spacing Directional Oil Wells Located on Existing, Large Well Pads	0.2 acres per well	432 new wells	74	--	50 new wells	9	--	15 new wells	3	--	497 new wells	99	--
1,041 Existing, Small Well Pads													
Existing 40-ac Spacing Vertical Oil Wells Located on Existing, Small Well Pads	--	893 existing pads	--	893	121 existing pads	--	121	27 existing pads	--	27	1,041 existing pads	--	-
New Directional 20-ac Spacing Oil Wells Located on Existing, Small Well Pads	0.2 acres per well	893 new wells	179	--	121 new wells	24	--	27 new wells	5	--	1,041 new wells	208	--
240 Proposed, Large Well Pads*													
New 40-ac Spacing Vertical Oil Wells Located on Proposed, Large Well Pads	2.0 acres per well	209 new wells	418	209	30 new wells	60	30	1 new wells	2	1	240 new wells	480	240
New Vertical Gas Wells Located on Proposed, Large Well Pads	0.8 acres per well	209 new wells	167	--	30 new wells	24	--	1 new wells	0.8	--	240 new wells	192	--
New Directional Gas Wells Located on Proposed, Large Well Pads	0.2 acres per well	627 new wells	125	--	90 new wells	18	--	3 new wells	1	--	720 new wells	144	--
New Directional 20-ac Oil wells Located on Proposed, Large Well Pads	0.2 acres per well	209 new wells	2	--	30 new wells	0	--	1 new wells	0	--	240 new wells	48	--
1,005 Proposed, Small Well Pads**													
New 40-ac Spacing Vertical Oil Wells Located on Proposed, Small Well Pads	2.0 acres per well	869 new wells	1,738	869	117 new wells	234	117	19	38	19	1,005 new wells	2,010	1,005
New 20-ac Spacing Directional Oil Wells Located on Proposed, Small Well Pads	0.2 acres per well	869 new wells	174	--	117 new wells	23	--	19	4	--	1,005 new wells	201	--
Subtotal	**--**	**--**	**3,136**	**2,403**	**--**	**422**	**318**	**--**	**63**	**62**	**5,750 new wells*****	**4,078**	**1,245**
Total Number of New Well Pads		**1,078 new well pads**	**--**	**--**	**147 new well pads**	**--**	**--**	**20 new well pads**	**--**	**--**	**1,245 new well pads**	**--**	**--**
Access Roads													
New Roads Co-located with Pipelines	40 feet[2]	193 miles	939	939	31	150	150	1	7	7	226 miles	1,096	1,096
Existing Roads co-located with New Pipelines	10 feet[3]	280 miles	339	339	25	30	30	14	17	17	318 miles	385	385
Subtotal	**--**	**473 miles**	**1,278**	**1,278**	**56 miles**	**180**	**180**	**15 miles**	**24**	**24**	**544 miles**	**1,482**	**1,482**
Pipelines													
Pipelines Co-located with New Roads	60 feet[4]	193 miles	1407	586	31	224	93	1	11	4	226 miles	1,644	685[5]

Project Feature	Size (disturbance width [feet] or acres/facility)	Federal Lands			State Lands			Private Lands			Project Total		
		Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]	Number or Miles	Initial (short-term) Surface Disturbance (acres)	Residual (long-term) Surface Disturbance (acres)[1]	Number or Miles	INITIAL (SHORT-TERM) SURFACE DISTURBANCE (ACRES)	RESIDUAL (LONG-TERM) SURFACE DISTURBANCE (ACRES)[1]
Pipelines Co-located with Existing Roads	60 feet[4]	280 miles	2033	847	25	183	76	14	100	41	318 miles	2,313	963[5]
Subtotal	--	**473 miles**	**3,440**	**1,433**	**56 miles**	**407**	**169**	**15 miles**	**111**	**45**	**544 miles**	**3,958**	**1,647**
Central Facilities													
Compressor Stations (New and Upgrades)	9.4 acres (avg.)	22	207	207	2	19	19	0	0	0	24	226	226
Gas Processing Plants	10.0 acres	1	10	10	0	0	0	0	0	0	1	10	10
Water Treatment and Injection Facilities	8/5 acres[6]	12	78	78	1	8	8	0	0	0	13	86[7]	86
Gas and Oil Separation Plants (GOSPs)	22.0 acres	10	220	220	2	44	44	0	0	0	12	264	264
Fresh Water Collector Well	1.7 acre	1	0	0	0	0	0	0	0	0	1	1.7	1.7
Pump Stations	3.0 acres	5	15	15	1	3	3	0	0	0	6	18	18
Subtotal	--	**51**	**530**	**530**	**6**	**74**	**74**	**0**	**0**	**0**	**57**	**604**	**604**
Total New Disturbance	--	--	**8,782**	**4,319**	--	**1,130**	**570**	--	**210**	**89**	**-**	**10,122**	**4,978**

Source Note: Project totals for numbers of wells, miles of roads/pipelines, and numbers of facilities have been broken down by federal, state and private surface land categories for analysis purposes only. These totals represent a rough estimate based on conceptual locations of surface facilities and infrastructure.

[1] Residual disturbance calculations are based on the assumption that interim reclamation will be initiated and successful.

[2] Initial disturbance assumes that a 100-foot wide disturbance corridor would be needed for construction, of which 40 feet would be used for new road construction and 60 feet for pipeline/utility line installation.

[3] Initial disturbance assumes that a 70-foot wide disturbance corridor would be needed for construction, of which 10 feet would be used for general road improvements and 60 feet for pipeline/utility line installation.

[4] Initial disturbance assumes that a 60-foot wide disturbance corridor would be needed for pipeline/utility line installation within new and existing road ROWs.

[5] Residual disturbance assumes that 35-foot wide portion of the original 60-foot wide disturbance corridor would be reclaimed leaving a 25-foot wide corridor for the long-term pipeline/utility corridor.

[6] Each new water treatment and injection facility would occupy a site approximately 8 acres in size. Existing water treatment and injection facility locations proposed for expansion would be increased in size by approximately 5 acres each.

[7] Includes 13 water treatment and injection facilities.

*Total pad size for each new, large well pad is anticipated to be 3.6 acres. Estimated disturbance per well on each new, large well pad is included for analysis purposes only.

** Total pad size for each new, small well pad is anticipated to be 2.2 acres. Estimated disturbance per well on each new, small well pad is included for analysis purposes only.

***Based on the well pad configuration the sum of the total number of wells under Alternative D may appear to be higher. However, BLM has assumed for analysis purposes that the number of wells drilled would not exceed that evaluated under the Proposed Action.

2.6.4.3 Pipeline Construction

Under Alternative D, approximately 226 miles of pipeline would be installed adjacent to proposed access roads (co-located) and approximately 318 miles of pipeline would be installed along existing roads. Corridor widths for pipelines under Alternative D would be the same as those previously described for the Proposed Action (see **Section 2.3.1.3**). Installation of pipelines along proposed and existing roads would result in approximately 1,644 acres and 2,313 acres of initial surface disturbance, respectively. As indicated in **Section 2.2.2.2**, in limited situations, a proposed pipeline would be installed independent of an access road (i.e., cross-country). Under Alternative D, an estimated 40 miles of cross-country pipeline could be installed. Based on a 50-foot-wide corridor, cross-country pipelines could result in approximately 242 acres of surface disturbance. As there are no conceptual locations for cross-country pipelines, they are not shown on maps for Alternative D, nor are they included in the GIS-based disturbance calculation tables.

2.6.4.4 Compressor Stations

Under Alternative D, Newfield would construct up to 24 new compressor stations within the MBPA. Each station would occupy an approximate 9.6 acre site and would produce up to 8,000 hp of compression. Compressor stations would not be reclaimed until they are no longer needed (up to 50 years), resulting in prolonged surface disturbance of approximately 226 acres.

2.6.4.5 Central Processing Plant

Under Alternative D, Newfield would construct one new central gas processing plant within the MBPA. The plant would occupy a site approximately 10 acres in size. Therefore, the initial surface disturbance resulting from the construction of the one new central gas processing plant would be approximately 10 acres.

Central facilities, including the proposed central gas processing plant, would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 10 acres.

2.6.4.6 Water Treatment and Injection Facilities

Under Alternative D, up to 13 new or existing water treatment and injection facilities would be constructed and/or expanded within the MBPA. The proposed water treatment facilities would be used for recycling of produced water that would either be co-mingled with fresh water and piped for waterflood injection wells, or trucked from the facility to be used at subsequent wells for completion activities.

Each new water treatment and injection facility would occupy a site approximately 8 acres in size. Existing water treatment and injection facility locations proposed for expansion would be increased in size by approximately 5 acres each. Therefore, the initial surface disturbance resulting from the construction of five new water treatment and injection facilities and expansion of five existing facilities would be approximately 86 acres.

As with other production facilities, water treatment and injection facilities would not be reclaimed during interim reclamation, because the total area of initial surface disturbance would be needed for operational activities. Therefore, the residual long-term surface disturbance would be the same as the initial surface disturbance of approximately 86 acres.

Additional information on proposed water treatment and injection facilities is provided in **Section 2.2.2.7**.

2.6.4.7 Gas and Oil Separation Plants (GOSPs)

Under Alternative D, up to 12 new GOSPs would be constructed that would be used for the initial separation of produced water and gas from the oil prior to shipment to the refinery for further processing. Conceptual locations for GOSPs are illustrated on **Figure 2-4 (Attachment 1)**. Each new GOSP would occupy a 22-acre site and would remain in use for the anticipated LOP (up to 50 years), resulting in long-term disturbance of approximately 264 acres.

Additional information on proposed GOSPs is provided in **Section 2.2.2.8**.

2.6.4.8 Pump Stations

Under Alternative D, six water pump stations would be constructed to ensure delivery of water to treatment and injection facilities. Each new pump station would occupy a 3-acre site, resulting in a total long-term disturbance of 18 acres.

2.6.5 Well Drilling

Based upon current technology and drilling rates in the MBPA, up to 12 drilling rigs could be active in the MBPA at any given time. Depending on the type of well drilled (i.e., Green River oil well or deep gas well), an average of 360 wells would be drilled annually. Also, based on the amount of time needed to drill a deep gas well, the timeframe to fully explore and develop the resource may need to be extended up to 30 years, based on commodity pricing for natural gas.

Information on well drilling is provided in **Section 2.2.3**.

2.6.6 Interim Reclamation

Under Alternative D, approximately 50 percent of surface disturbance associated with construction of proposed well pads and expansion of existing well pads, road and pipeline ROWs, and other project facilities not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of Alternative D to approximately 4,978 acres.

Information on interim reclamation is provided in **Section 2.2.5**.

2.6.7 Water Requirements

2.6.7.1 Drilling and Completion

Information on water requirements for drilling and completion activities is provided in **Table 2.6.7.1-1**.

TABLE 2.6.7.1-1
WATER REQUIREMENTS FOR WELL DRILLING AND COMPLETION, DUST SUPPRESSION, AND WATERFLOODING OPERATIONS UNDER ALTERNATIVE D

Activity/Phase	Number of Wells / Well Pads	Amount of Water Required per Well (acre-feet)	Total Water Use (acre-feet)	Annual Water Use (acre-feet)
Well Drilling and Completion[1]				
New Vertical Green River Oil Wells	750	0.9	675	42*
New Directional Green River Oil Wells	2,500	0.9	2,250	141*
New Vertical and Directional Deep Gas Wells	2,500	6.2	15,500	967*
Subtotal for the 16-year active well drilling and completion period	5,750	--	18,425	1,150*
Dust Suppression				
Construction of New Well Pads / Expansion of Existing Well Pads and Associated Roads and Pipeline/Utility Corridors	278	0.08[2]	22	1.4
Subtotal for the 16-year Active Well Drilling and Completion Period	**278**	**--**	**22**	**1.4**
Operation of New Well Pads / Expansion of Existing Well Pads and Associated Roads and Pipeline/Utility Corridors	278	0.13[3]	723 – 1,084	36[4]
Subtotal for the 20- to 30-Year Operational Period	**--**	**--**	723 – 1,084	36
Waterflooding Infrastructure and Operations				
Conversion of up to 750 injection wells	750	0.01[5]	54,760 – 82,140[6]	2,738
TOTAL	**--**	**--**		

[1] Assumes a 16-year active well drilling and completion period.
[2] Approximately five water trucks (approximately 650-bbls or 0.08 acre-feet) would be needed for dust suppression per new or expanded well pad, access road, and pipeline/utility corridor during construction activities, for approximately 10 percent of the proposed project (i.e., 10 percent of the 2,783 expanded and new well pads).
[3] Approximately eight water truck (approximately 1000-bbls or 0.13 acre-feet) would be needed annually for dust suppression per new or expanded well pad, access road, and pipeline/utility corridor during project operation, for approximately 10 percent of the proposed project (i.e., facilities10 percent of the 2,783 expanded and new well pads).
[4] Calculated based on 36 acre-feet annually.
[5] Assumes 0.01 acre-feet of water per well daily.
[6] Calculated based on 2,738 acre-feet annually over the 10-year conversion period.
* Based on average annual water use.
Note: Summations may not total precisely due to rounding.

2.6.7.2 Dust Suppression

Approximately 650 bbls (0.08 acre-feet) of fresh water would be needed for dust suppression per new well pad, associated access road, and pipeline/utility corridor for approximately 10 percent of the proposed wells during construction (i.e., for approximately 278 new or existing to be expanded well pads and their associated roads, pipeline/utility corridors, and other surface facilities). A total of approximately 1.4 acre-feet of water would be needed annually for dust suppression during construction activities under Alternative D.

In addition, approximately 1,000 bbls (0.13 acre-feet) of water would be needed annually for dust suppression per new or expanded well pad, associated access road, and pipeline/utility corridor during project operations, again for approximately 10 percent of the proposed project (i.e., for approximately 278 well pads and their associated roads, pipeline/utility corridors, and other surface facilities). Therefore, implementation of Alternative D would require approximately 36 acre-feet of water annually for dust abatement during project operations.

Information on water used for dust suppression activities is provided in **Section 2.2.8.2**.

2.6.7.3 Waterflooding Infrastructure and Operations

Newfield would use waterflooding technology on all of the proposed 40-acre spaced Green River wells (i.e., approximately 750 wells) after about the first 3 years of production. A total of approximately 75 to 100 bpd, or approximately 0.01 acre-feet per day, of water would be required for each waterflood injection well. Newfield would convert approximately 750 of their proposed wells to injection wells, therefore requiring approximately 7.5 acre-feet of fresh and produced water per day for injection purposes. Based on the requirement of 7.5 acre-feet of water per day, the annual water requirement for waterflooding operations would be approximately 2,738 acre-feet. Under Alternative D, it is assumed Newfield would use 40 to 50% recycled water for waterflooding purposes (nearly all available recycled water).

Information on water requirements for waterflooding infrastructure and operations is provided in **Section 2.2.8.3**.

2.6.8 Produced Water Disposal

Under Alternative D, up to 13 new water treatment and injection facilities and a new water disposal well would be constructed. In addition, up to six pump stations would be constructed under Alternative D.

If required, the water disposal well would be drilled in the MBPA on an existing well pad or using an existing well boring. The new disposal well would have an average capacity of 4,000 BWPD. Although future water production is difficult to predict because of variable water saturation conditions as the oil and gas formations are produced and depleted, it is estimated for purposes of analysis in this EIS that Newfield would use 40 to 50% recycled water for waterflooding purposes (nearly all available recycled water).

Additional information on produced water disposal is provided in **Section 2.2.9**.

2.6.9 Workforce Requirements

The active workforce needed to develop Alternative D is estimated in **Table 2.6.6-1**.

TABLE 2.6.9-1
ESTIMATED WORKFORCE REQUIREMENTS UNDER ALTERNATIVE D

Work Category	Time Requirements	Number of Facilities/ Miles	Personnel Required (No. per day)	Workdays for Project	Average Workdays per Year	Average Workers per Day[1]
Construction and Installation						
Access Road	4 days/mile	544	8	17,408	1,088	5
Well Pad (new and expansion of existing)	3 days/site	2,783	8	66,792	4,174	17
Pipelines	10 days/mile	544	10	54,400	3,400	14
Drilling and Casing	4 days/well	5,750	8	184,000	11,500	48
Well Completion	4 days/well	5,750	20	460,000	28,750	120
Well Production	10 days/well	5,750	16	920,000	57,500	240
Central Facilities	45 days/site	57	20	51,300	3,206	13
Total				**1,753,900**	**109,618**	**457**
Operation and Maintenance						
Road/Well Pad Maintenance	120 days/year	N/A	3	16,560	360	2
Pumpers	260 days/year	N/A	36	430,560	9,360	39
Office	260 days/year	N/A	3	47,840	1,040	4
Well Workover	5 days/well	30 per year	2	6,900	150	1
Total				**501,860**	**10,910**	**45**
Reclamation and Abandonment[4]						
Well Pads	3 days/well pad	2,783	4	33,396	N/A	--
Roads and Pipelines	4 day/mile	544	4	8,704	N/A	--
Central Facilities	30 day/facility	57	16	27,360	N/A	--
Total				**69,460**	**--**	**--**

[1] Average workdays per year divided by an assumed 240 days in a work year.
[2] Based on a 16-year construction schedule.
[3] Based on a 46-year production and operation schedule.
[4] Includes interim reclamation.

2.7 COMPARISON SUMMARY OF DESIGN FEATURES AMONG ALTERNATIVES

Table 2-7 summarizes the number of well pads, miles of access road, miles of pipeline, production facilities, and other design or project features that would occur under each alternative.

2.8 ALTERNATIVES CONSIDERED BUT DISMISSED FROM ANALYSIS

All issues identified during scoping have been addressed in the range of alternatives carried forward for analysis. Alternatives C and D were specifically developed and refined in response to issues raised by the BLM, Cooperating Agencies, and the public during both internal and public scoping as well as the DEIS public comment period. In addition, all alternatives considered during the alternative development phase were carried forward for full analysis. Therefore, there were no alternatives considered but dismissed from analysis.

TABLE 2.7-1
DESIGN FEATURE SUMMARY COMPARISON AMONG ALTERNATIVES

ALTERNATIVE		ALTERNATIVE A - PROPOSED ACTION			ALTERNATIVE B - NO ACTION ALTERNATIVE			ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION			ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE		
Project Feature	**Size (disturbance width [feet] or acres/facility)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)[1]**
Well /Well Pad Count and Surface Disturbance Estimate													
New Green River Oil Well Pads and Vertical Wells on 40-acre Surface Density and Downhole Spacing	2.0 acres per well pad	750	1,500	750	128	256	128	750	1,500	750	--	--	--
New Green River Oil Well on 20-acre Downhole Spacing Directionally Drilled from Existing or New Well Pads	0.2 acre per well	2,500	500	500	--	--	--	2,500	500	500	--	--	--
New Deep Gas Well Pads and Vertical or Directional Wells on 40-acre Surface Density and Downhole Spacing	3.0 acres per well pad	2,500	7,500	2,500	--	--	--	2,500	7,500	2,500	--	--	--
New Green River Oil and/or Deep Gas Wells on 20-acre Downhole Spacing Directionally Drilled from Existing or New Well Pads	0.2 acre per well	--	--	--	419	84	84	--	--	--	--	--	--
Wells Remaining to be Drilled under other Approved or Proposed Newfield Projects	2.0 acres[2] per well pad	--	--	--	241	48	48	--	--	--	--	--	--
Existing, Large Well Pads													
Existing 40-ac Spacing Vertical oil Wells Located on Existing, Large Well Pads	2.0 acres of existing pad disturbance	--	--	--	--	--	--	--	--	--	497 existing pads	--	--
New Vertical Gas Wells Located on Existing, Large Well Pads	0.8 acres per well	--	--	--	--	--	--	--	--	--	497 new wells	398	--
New Directional Gas Wells Located on Existing, Large Well Pads	0.2 acres per new well	--	--	--	--	--	--	--	--	--	1,491 new wells	298	--
New 20-ac Spacing Directional 20-ac Oil Wells Located on Existing, Large Well Pads	0.2 acres per new well	--	--	--	--	--	--	--	--	--	497 new wells	99	--
Existing, Small Well Pads													
Existing 40-ac Spacing Vertical Oil Wells Located on Existing, Small Well Pads	2.0 acres of existing pad disturbance	--	--	--	--	--	--	--	--	--	1,041 existing pads	--	--
New Directional 20-ac Spacing Oil Wells Located on Existing, Small Well Pads	0.2 acres per new well	--	--	--	--	--	--	--	--	--	1,041 new wells	208	--

ALTERNATIVE		ALTERNATIVE A - PROPOSED ACTION			ALTERNATIVE B - NO ACTION ALTERNATIVE			ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION			ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE		
Project Feature	**Size (disturbance width [feet] or acres/facility)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)[1]**
Proposed, Large Well Pads													
New 40-ac Spacing Vertical Oil Wells Located on Proposed, Large Well Pads	2.0 acres per well	--	--	--	--	--	--	--	--	--	240 new pads	480	240
New Vertical Gas Wells Located on Proposed, Large Well Pads	0. 8 acres per well	--	--	--	--	--	--	--	--	--	240 new wells	192	--
New Directional Gas Wells Located on Proposed, Large Well Pads	0.2 acres per well	--	--	--	--	--	--	--	--	--	720 new wells	144	--
New Directional 20-ac Oil wells Located on Proposed, Large Well Pads	0.2 acres per well	--	--	--	--	--	--	--	--	--	240 new wells	48	--
Proposed, Small Well Pads													
New 40-ac Spacing Vertical Oil Wells Located on Proposed, Small Well Pads	2.0 acres per well	--	--	--	--	--	--	--	--	--	1,005 new wells	2,010	1,005
New 20-ac Spacing Directional 20-ac Oil Wells Located on Proposed, Small Well Pads	0.2 acres per well	--	--	--	--	--	--	--	--	--	1,005 new wells	201	--
Subtotal	**--**	**5,750 wells**	**9,500**	**3,750**	**788 wells**	**388**	**260**	**5,750 wells**	**9,500**	**3,750**	**5,750 wells***	**4,078**	**1,245**
Access Roads													
New Roads Co-located with Pipelines	40 feet[4]	243 miles	1,178	1,178	23.5 miles	114	114	243 miles	1,178	1,178	226 miles	1,096	1,096
Existing Roads with New Pipelines	10 feet[5]	363 miles	440	440	45 miles	55	55	363 miles	440	440	318 miles	385	385
Subtotal	**--**	**606 miles**	**1,618**	**1,618**	**68 miles**	**169**	**169**	**606 miles**	**1,618**	**1,618**	**544 miles**	**1,482**	**1,482**
Total Number of New Well Pads	**--**	**3,250 new pads**	**--**	**--**	**369 new pads**	**--**	**--**	**3,250 new pads**	**--**	**--**	**1,245 new pads**	**--**	**--**
Pipelines and Utility Lines													
Pipelines Co-located with New Roads	60 feet	243 miles	1,767	736	--	--	--	243 miles	1,767	736	226 miles	1,644	685
Pipelines Co-located with Existing Roads	60 feet	363 miles	2,640	1,100[7]	--	--	--	363 miles	2,640	1,100	318 miles	2,313	963

ALTERNATIVE		ALTERNATIVE A - PROPOSED ACTION			ALTERNATIVE B - NO ACTION ALTERNATIVE			ALTERNATIVE C - FIELD-WIDE ELECTRIFICATION			ALTERNATIVE D - AGENCY PREFERRED ALTERNATIVE		
Project Feature	**Size (disturbance width [feet] or acres/facility)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)**	**Number or Miles**	**Initial (short-term) Surface Disturbance (acres)**	**Residual (long-term) Surface Disturbance (acres)[1]**
Pipelines Co-located with New Roads	30 feet				23.5 miles	85	57		--	--	--	--	--
Pipelines Co-located with Existing Roads	30 feet	--	--	--	45 miles	164	109	--	--	--	--	--	--
Proposed Transmission Lines	30 feet	--	--	--	--	--	--	35 miles	255	255	--	--	--
Proposed Distribution Lines	20 feet	--	--	--	--	--	--	606 miles	3672	3672	--	--	--
Subtotal	**--**	**606 miles**	**4,407**	**1,836**	**68 miles**	**249**	**166**	**796**	**8,334**	**5,673**	**544**	**3,958**	**1,647**
Central Facilities													
Compressor Stations (New/Upgrades)	10 acres	24	226	226	2	20	20	24	226	226	24	226	226
Gas Processing Plants	10.0 acres	1	10	10	1	10	10	1	10	10	1	10	10
Water Treatment and Injection Facilities	8/5 acres[1]	13	86	86	1	7	7	13	86	86	13	867	86
Gas and Oil Separation Plants (GOSPs)	22.0 acres	12	264	264	1	22	22	12	264	264	12	264	264
Fresh Water Collector Well	1.7 acres	1	**1.7**	**.7**	1	**1.7**	**.7**	1	**1.7**	**.7**	1	1.7	1.7
Pump Stations	3/5 acres	6	18	18	1	5	5	6	18	18	6	18	18
Generating Stations	5.0 acres	--	--	--	--	--	--	11	55	55	--	--	--
Subtotal	**--**	**57**	**604**	**604**	**7**	**64**	**64**	**68**	**659**	**659**	57	604	604
Total New Disturbance	**--**	**--**	**16,129**	**7,808**	**--**	**870**	**659**	**--**	**20,112**	**10,173**	**--**	**10,122**	**4,978**
Life of Project (LOP)		41 to 51 Years			28 to 38 Years			41 to 51 Years			41 to 51 Years		

*Based on the well pad configuration the sum of the total number of wells under Alternative D may appear to be higher. However, BLM is assuming for analysis purposes that the number of wells drilled would not exceed that evaluated under the Proposed Action.

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After BLM review of the terms of the BLM leases and the Monument Butte Unit Agreement, it has been determined that of the ten BLM leases that intersect Core areas and do not have wells drilled on them (see Appendix J Figure 6), eight are committed to the Greater Monument Butte Unit and are held by Unit production, and the other two, although not committed to the Unit, are already subject to No Surface occupancy stipulations in their lease terms.

The question was asked whether surface disturbance restrictions in core areas would result in the leases not being developed and as a result being dropped from the Unit, which would adversely affect lease interest owners. The Greater Monument Butte Unit is a secondary recovery unit. This unit was approved by the BLM and the SITLA. In addition, the unit was approved by the Utah Board of Oil, Gas and Mining under Utah Statutes 40-6-7 and 40-6-8. All tracts have undergone compulsory unitization and are considered fully committed to the unit area.

The terms of the Unit Agreement do not provide for contraction or elimination of lands from the Unit. Utah Statute 40-6-8(5) explicitly provides:

5) An order providing for unit operations may be amended by an order made by the board in the same manner and subject to the same conditions as an original order providing for unit operations, provided:

(a) If such an amendment affects only the rights and interests of the owners, the approval of the amendment by the owners of royalty, overriding royalty, production payments and other such interests which are free of costs shall not be required.

(b) No such order of amendment shall change the percentage for the allocation of oil and gas as established for any separately owned tract by the original order, or change the percentage for allocation of cost as established for any separately owned tract by the original order.

Therefore the BLM has determined it is unlikely that the eight standard term leases which are committed to the Unit will be dropped from the Unit due to surface disturbance restrictions. However, for analysis purposes in the EIS it was anticipated that under Alternative D, some undetermined amount of oil and gas resources contained within these leases, (whatever can't be reached by directional drilling from areas outside the Core 1 areas) with the attendant royalties, taxes, and other revenues, would not be realized under Alternative D.

However, in accordance with the Endangered Species Act Section 7 (A) (3), as part of ongoing coordination between Newfield , BLM, and FWS, Newfield has estimated that eight new multi-well pads encompassing between 6 and 50 acres of surface disturbance would be necessary in Level 1 Core Conservation Areas for Sclerocactus. These eight well pads are not evaluated in the agency preferred alternative (although they are included within the range of alternatives). These eight well pads were not evaluated in the EIS agency preferred alternative, although they are included within the range of alternatives analyzed in the EIS. Since they are included in and are the primary subject of the FWS/Newfield cactus strategy (Appendix J – Biological Opinion Attachment F), they were included for consultation in this project's Biological Assessment.

3.0 AFFECTED ENVIRONMENT

This chapter discusses the physical, biological, social, and economic factors as they currently exist within the MBPA and surrounding region. Management issues identified by the BLM VFO, public scoping, and interdisciplinary analysis of the MBPA have provided guidance on the material presented herein.

The area of the affected environment for individual resources was assessed based on the area of potential direct and indirect environmental impacts. For most resources, the affected environment includes the immediate boundaries of the MBPA. However, some resources (e.g., watersheds, air quality, and socioeconomics) are addressed in a larger regional context.

3.1 GENERAL SETTING

The MBPA is located within the Uinta Basin of the Colorado Plateau physiographic province. The basin is a bowl-shaped structural and sedimentary feature that trends roughly east to west, has a maximum width of about 115 miles, and covers an area of approximately 10,890 square miles. The basin is bounded on the north by the Uinta Mountains and on the east by the Douglas Creek Arch, with portions of the Wasatch Range and the Roan Cliffs forming its westernand southern boundaries.

Elevation within the MBPA ranges from approximately 4,632 feet above mean sea level (amsl), in the eastern portion near the Green River, to approximately 6,867 feet amsl, in the southwestern portion near Gilsonite Draw. Numerous drainages transect the MBPA, including Wells Draw, Castle Peak Draw, Petes Wash, Sheep Wash, Big Wash, and a number of other unnamed ephemeral features. These drainages, in combination with the plateaus of Pariette Bench and Eight Mile Flat, create a pattern of uplands and lowlands oriented southwest to northeast.

The vegetation within the MBPA and surrounding region consists of typical Intermountain Basin shrubland associations. This region mixes an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors to produce a mosaic of floristic components and associated natural habitats. These ecological communities are often mixed, transitional, or widely distributed.

The MBPA encompasses approximately 119,743 acres of land within southeastern Duchesne County and southwestern Uintah County. The MBPA spans a distance of approximately 25 miles east to west and 9 miles north to south. The Town of Vernal is approximately 33 miles northeast of the MBPA boundary, and Myton is located approximately 5.5 miles to the north. Land ownership in the MBPA is approximately 87 percent Federal (managed by the BLM), approximately 11 percent State of Utah (managed by SITLA), and approximately 2 percent private. Mineral interests are owned by the BLM (89 percent), the State of Utah (10 percent), and private interests (less than 1 percent). Lands with separate surface and mineral ownership, also known as “split estate lands,” comprise approximately 18 percent of land within the MBPA.

3.2 AIR QUALITY

Regional air quality is influenced by a combination of factors: climate, meteorology, the magnitude and spatial distribution of air pollution sources, and the chemical properties of emitted pollutants. Within the lower atmosphere, regional and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants. The following sections summarize the climatic conditions and existing air quality within the MBPA and surrounding region for the Proposed Action and alternatives.

The MBPA covers areas both within and outside of the exterior boundaries of Indian Country. The EPA has primary regulatory authority for implementing various environmental statutes including the Federal CAA and the permitting of air emission sources within the exterior boundaries of Indian Country. All other areas are regulated by the Utah Department of Environmental Quality (UDEQ). Specifically, the Division of Air Quality (DAQ) has the regulatory authority to issue air permits for stationary point sources outside of Indian Country, though it typically does not issue permits for mobile and temporary sources such as drill rigs.

3.2.1 Climate

The MBPA is located in the Uinta Basin, a semi-arid, mid-continental climate regime. The elevation ranges from approximately 4,632 to 6,867 feet amsl. The terrain gently slopes downward from the southwest to the northeast. The Uinta Basin is bordered by the Wasatch Range to the west, which extends north and south through the middle of the State, and by the Uinta Mountains to the north, which extend east and west through the northeast portion of the State.

3.2.1.1 Temperature and Precipitation

The closest station to the MBPA with a complete and current climatic record is located in Myton, Utah. The Myton station is located approximately 11 miles north of the geographic center of the MBPA, with an elevation of 5,080 feet amsl. **Table 3.2.1.1-1** summarizes the mean temperature range, mean total precipitation, and mean total snowfall data collected at Myton by month from 1915 to 2012 (WRCC 2012a).

The annual mean precipitation at Myton is 6.86 inches, and ranges from a minimum of 1.34 inches, recorded in 1974, to a maximum of 13.71 inches, recorded in 1941. On average, February is the driest month of the year, with a monthly mean precipitation of 0.33 inches, and October is the wettest month, with a monthly mean precipitation of 0.82 inches. The annual average snowfall is 14.2 inches, with December being the snowiest month. A maximum annual snowfall of 50.7 inches was recorded in 1949 (WRCC 2012b).

The annual mean temperature at Myton is 46.1 degrees Fahrenheit (°F). However, abundant sunshine and rapid nighttime cooling result in a wide daily range in temperature. Wide seasonal temperature variations typical of a mid-continental climate regime are also common. Average monthly winter temperatures range from about 7° F to 34° F, while average summer temperatures range from 51° F to 87° F. Recorded daily extreme temperatures are minus 39 ° F in 1937 and 104 ° F in 1958 (WRCC 2012c).

TABLE 3.2.1.1-1
TEMPERATURE, PRECIPITATION, AND SNOWFALL DATA AT MYTON, UTAH

Month	Average Temperature Range (in degrees Fahrenheit)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
January	2.1 - 29.5	0.36	3.3
February	9.9 – 37.6	0.33	2.6
March	22.2 – 51.9	0.44	1.8
April	31.3 – 63.5	0.60	0.5
May	40.0 – 73.4	0.70	0.1
June	47.3 – 83.2	0.59	0.0
July	54.5 – 90.0	0.62	0.0

Month	Average Temperature Range (in degrees Fahrenheit)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
August	52.5– 87.7	0.78	0.0
September	43.7 – 79.0	0.81	0.0
October	32.6 – 65.1	0.82	0.3
November	19.5 – 47.5	0.42	1.8
December	8.3 – 33.2	0.40	3.8
Total Annual Average	**30.3 – 61.8**	**6.86**	**14.2**

Source: WRCC 2012a. Data collected at Myton, Utah from 8/27/1915 to 2/25/2012.

3.2.1.2 Winds and Atmospheric Stability

In addition to the climatic data discussed in **Section 3.2.1.1**, other sources of meteorological data are available in and near the MBPA. Several Remote Air Weather Stations broadcast hourly wind speed and direction, temperature, and relative humidity to the National Interagency Fire Center. There are also UDEQ-operated air quality monitoring stations (Ouray and Redwash) and additional special study and research monitors (e.g., the 2012 Uintah Basin Winter Ozone and Air Quality Study that added an ozone monitor at Pariette Draw, among other locations).

According to UDEQ, the most complete wind speed and direction data set that is suitable for air quality impact modeling analyses most representative of the MBPA comes from the Vernal, Utah station, which is located approximately 38 miles northeast of the geographic center of the MBPA. **Figure 3.2.1.2-1 (Attachment 1)** illustrates a wind rose that depicts wind speed and direction based on 5 years of data collection (period 2005 through 2009) at the Vernal station (UDEQ-DAQ 2011). The data represent the direction from which the wind is coming. As shown by the wind rose, winds originate predominantly from the west-northwest. The average measured wind speed is 4.8 miles per hour (2.2 meters/second). Winds are calm 10 percent of the time. Although local terrain effects will influence the wind profiles specific to the MBPA, data from the Vernal station are representative of the rural, gently sloping terrain of the MBPA.

Wind speed and direction are important to the dilution and transport of air pollutants. Wind direction will determine where air pollutants are transported. Based on the Vernal wind rose, air pollutants would be transported in an easterly direction within and out of the MBPA. Wind speed is a determining factor in the concentration of air pollutants. Dispersion of air pollutants increases with increasing wind speeds, thereby decreasing air pollutant concentrations.

The degree of stability in the atmosphere is also significant to the dispersion of emitted pollutants. During stable conditions, vertical movement in the atmosphere is limited, and the dispersion of pollutants is inhibited. Conversely, during unstable conditions, upward and downward movement in the atmosphere prevails, and dispersion of pollutants in the atmosphere is enhanced. Temperature inversions (when air temperatures increase with height) can result in very stable conditions with virtually no vertical air motion. The region of the MBPA will typically have more large-scale temperature inversions in the winter rather than in the summer, due to colder stable air masses settling closer to the ground. Afternoons in the region of the MBPA typically have increasing instability due to warming.

3.2.2 Regulatory Environment

Although the purpose of this EIS is not to delegate permitting authority, activities under the Proposed Action and alternatives would be regulated under the CAA of 1970, as amended (42 U.S.C. 7401, et seq.). The following are the applicable sections of the CAA and how they would apply to the Proposed Action and alternatives.

3.2.2.1 National Ambient Air Quality Standards

Ambient air quality in a given location may be characterized by comparing the concentration of various pollutants in the ambient air with the standards set by federal and state agencies. Under the authority of the CAA, the EPA has established nationwide air quality standards, known as the National Ambient Air Quality Standards (NAAQS). These standards represent the maximum allowable atmospheric concentration of the criteria pollutants, of which there are six. There are primary and secondary standards for these pollutants. The primary standards were established to protect the public health within an adequate margin of safety; the secondary standards were established to protect the public welfare from any known or anticipated adverse effects of a pollutant. Pollutants for which standards have been set include carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM_{10} and $PM_{2.5}$), ozone (O_3), sulfur dioxide (SO_2), and lead. **Table 3.2.2.1-1** lists the current NAAQS and averaging times for each criteria pollutant. Individual states must meet the NAAQS but may adopt their own standards that are at least as stringent as the NAAQS. Utah has adopted the NAAQS as the State ambient air quality standards.

If the ambient air in a specified region meets the NAAQS, it is designated as an attainment area. Conversely, if a region does not meet the NAAQS, it is designated as being in nonattainment. Attainment and nonattainment determinations are made by analyzing air monitoring data. If an area does not have adequate air monitoring data to make a determination, it is designated unclassified and treated as an attainment area. The Uinta Basin (where the MBPA is located) is designated as attainment or unclassified for all criteria pollutants.

TABLE 3.2.2.1-1.
NATIONAL AMBIENT AIR QUALITY STANDARDS AND PREVENTION OF SIGNIFICANT DETERIORATION (PSD) CLASS II INCREMENTS

Criteria Pollutant	Averaging Period(s)	NAAQS[a]	PSD Class I Increments ($\mu g/m^3$)[b]	PSD Class II Increments ($\mu g/m^3$)[b]
CO	1-hour 8-hour	35 ppm (40,000 $\mu g/m^3$) [c] 9 ppm (10,000 $\mu g/m^3$) [c]	None None	None None
NO_2	1-hour Annual	100 ppb (188 $\mu g/m^3$) [d] 0.053 ppm (100 $\mu g/m^3$) [e]	None 2.5	None 25
PM_{10}	24-hour Annual	150 $\mu g/m^3$ [f] -----	8 4	30 17
$PM_{2.5}$	24-hour Annual	35 $\mu g/m^3$ [d] 12 $\mu g/m^3$ [g]	2 1	9 4
O_3	8-hour	0.075 ppm [h]	None	None

Criteria Pollutant	Averaging Period(s)	NAAQS[a]	PSD Class I Increments ($\mu g/m^3$)[b]	PSD Class II Increments ($\mu g/m^3$)[b]
SO_2	1-hour	75 ppb (196 $\mu g/m^3$) [i]	None	None
	3-hour	0.5 ppm (1,300 $\mu g/m^3$) [c]	25	512
	24-hour	-----	5	91
	Annual	-----	2	20
Lead	Rolling 3 month	0.15 $\mu g/m^3$ [j]	None	None

[a] Source: 40 CFR Part 50
[b] Source: 40 CFR Part 51.166(c)
[c] Not to be exceeded more than once per year.
[d] 98th percentile averaged over 3 years.
[e] Annual mean.
[f] Not to be exceeded more than once per year on average over 3 years.
[g] Annual mean, averaged over 3 years.
[h] Annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years.
[i] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
[j] Not to be exceeded.

3.2.2.2 Prevention of Significant Deterioration

Under the Prevention of Significant Deterioration (PSD) provisions of the CAA (40 CFR 50.166), incremental increases of specific pollutant concentrations are limited above a legally defined baseline level for new or modified major stationary sources in attainment or unclassified areas. "Major stationary sources" are defined as those that emit 100 tons per year of any criteria pollutant for the source categories specifically listed in 40 CFR 51.166, or those that emit 250 tons per year for all other source categories. Emission sources corresponding to the Proposed Action or alternatives would be considered a major stationary source under PSD if they emitted 250 tons per year of a criteria pollutant, because they are not specifically listed in the source categories.

The PSD increments are based on area classes. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas of the State not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed. The MBPA and surrounding area is designated as PSD Class II. The PSD increments for Class II areas are presented in **Table 3.2.2.1-1**. The closest Class I areas to the MBPA are Arches National Park (85 miles south) and Canyonlands National Park (106 miles south). Dinosaur National Monument is a sensitive Class II area located approximately 40 miles northeast of the MBPA. The term "sensitive Class II area" will be used to describe those Class II parks and wilderness areas where the Federal Land Managers (FLMs) have air quality concerns. Even though sensitive Class II areas do not receive the same protection as Class I areas under the CAA, FLMs have other mandates to protect those areas.

3.2.2.3 New Source Performance Standards

New Source Performance Standards (NSPS) are pollution control standards developed by the EPA under the authority of the CAA (40 CFR Part 60). NSPS apply to specific categories of new, modified, and reconstructed stationary sources. They define emission limits for specified pollutants, compliance requirements, monitoring requirements, and test methods and procedures. NSPS Standards of Performance that would potentially be applicable to the Proposed Action and alternatives include:

- Subpart K: Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978
- Subpart Ka: Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984
- Subpart Kb: Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984
- Subpart KKK: Equipment Leaks of Volatile Organic Compounds (VOCs) from Onshore Natural Gas Processing Plants
- Subpart LLL: Onshore Natural Gas Processing: SO_2 Emissions
- Subpart IIII: Stationary Compression Ignition Internal Combustion Engines
- Subpart JJJJ: Stationary Spark Ignition Internal Combustion Engines
- Subpart KKKK: Stationary Combustion Turbines
- Subpart OOOO: Crude Oil and Natural Gas Production, Transmission and Distribution

3.2.2.4 Hazardous Air Pollutants

Hazardous Air Pollutants (HAPs) are pollutants that are known to cause, or are suspected of causing, cancer or other serious health effects, or that can cause adverse environmental and ecological impacts. The EPA has classified 187 air pollutants as HAPs under the amended CAA of 1990. Examples of listed HAPs associated with the oil and gas industry include formaldehyde, benzene, toluene, ethylbenzene, xylene (BTEX compounds), and normal-hexane (n-hexane).

There are no applicable Federal or State of Utah ambient air quality standards for HAPs; therefore, reference concentrations (RfC) for chronic inhalation exposure and Reference Exposure Levels (REL) for acute inhalation exposures are used to evaluate potential impacts of HAPs. RfCs represent an estimate of the continuous inhalation exposure rate to the human population without an appreciable risk of harmful effects. The REL is the acute concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects. The State of Utah has adopted Toxic Screening Levels (TSLs), which are applied during the air permitting process, to assist in the evaluation of HAPs released into the atmosphere.

Under Section 112 of the CAA, the EPA is required to develop regulations establishing National Emission Standards for Hazardous Air Pollutants (NESHAPs) for all specific source categories. These standards are established to reflect the maximum degree of reduction in HAP emissions determined to be achievable through application of Maximum Achievable Control Technology (MACT). The potentially applicable MACT standards (40 CFR Part 63) for the Proposed Action and alternatives include the following NESHAPs:

- Subpart HH: Oil and Natural Gas Production Facilities
- Subpart HHH: Natural Gas Transmission and Storage Facilities
- Subpart EEEE: Organic Liquids Distribution (Non-Gasoline)
- Subpart YYYY: Stationary Combustion Turbines
- Subpart ZZZZ: Stationary Reciprocating Internal Combustion Engines (RICE)
- Subpart DDDDD: Industrial, Commercial, and Institutional Boilers and Process Heaters
- Subpart JJJJJJ: Industrial, Commercial, and Institutional Boilers Area Sources

3.2.2.5 Greenhouse Gases

Greenhouse gases (GHGs) exist in the earth's atmosphere and absorb outgoing infrared radiation, thus trapping heat in the atmosphere. Some GHGs, such as water vapor, carbon dioxide, methane, and nitrous oxide, can occur naturally, while others come from anthropogenic activities (i.e., resulting from or produced directly by human activities). Other GHGs, such as hydrofluorocarbons, result only from anthropogenic activities. Greenhouse gases are chemically stable and persist in the atmosphere. They can also become well mixed throughout the atmosphere before being removed by physical or chemical processes. Because these stable gases are well mixed, the impacts from their presence occur over a larger region. For this reason, GHG concentrations are typically discussed on a global or regional scale, rather than a local airshed. Likewise, the impacts of atmospheric concentrations of GHGs are also discussed on a global or regional scale. The Proposed Action and alternatives would generate GHGs, including carbon dioxide, methane, and nitrous oxide.

The CEQ released draft guidance in 2010 on how Federal agencies should consider and evaluate GHG emissions and climate change under NEPA. If a proposed action is expected to cause direct emissions of 25,000 metric tons or more of carbon dioxide-equivalent GHG emissions on an annual basis, a quantitative and qualitative assessment should be considered together with the mitigation measures and reasonable alternatives to reduce GHG emissions.

The EPA published Mandatory Reporting of Greenhouse Gases (40 CFR Part 98) in October 2009. This rule requires mandatory reporting of GHG emissions for 41 source categories that generally emit more than 25,000 metric tons or more of carbon dioxide-equivalent GHG emissions on an annual basis. This rule does not provide any emission limits for GHGs. Additionally, Subpart W of 40 CFR Part 98 was issued in November 2010. This Subpart specifically addresses reporting of GHG from Petroleum and Natural Gas Systems. The Proposed Action and alternatives may also be subject to Subpart C of 40 CFR Part 98, which regulates reporting of General Stationary Fuel Combustion Sources.

3.2.3 Existing Air Quality

3.2.3.1 Existing Sources of Air Pollution

As a rural area, the Uinta Basin has seen recent oil and gas development on Tribal, Federal, and private lands or minerals. Existing point, area, and fugitive sources of air pollution within the MBPA and surrounding region include the following, among others:

- Exhaust emissions of mainly CO, NOx, and diesel exhaust particulate from drill rig engines associated with oil and gas exploration and development.
- Fugitive dust (PM_{10} and $PM_{2.5}$) and other emissions associated with construction and development of oil and gas well sites.
- Emissions of CO, NOx, VOC, PM_{10}, and $PM_{2.5}$ from equipment located at producing oil and gas well heads (e.g., heaters, separators, tanks, pumpjack engines, etc.).
- Exhaust emissions (primarily CO, oxides of nitrogen (NOx), and formaldehyde) from natural gas fired compressor engines used in production of natural gas.
- Natural gas dehydrator still-vent emissions of HAPs, including benzene, toluene, ethylbenzene, xylene, and n-hexane.
- Gasoline and diesel-fueled vehicle tailpipe emissions of VOCs, NOx, CO, SO_2, PM_{10} or $PM_{2.5}$.
- Fugitive dust (in the form of PM_{10} and $PM_{2.5}$) from vehicle traffic on unpaved and paved roads, wind erosion in areas of soil disturbance, and road sanding during winter months.

- Long range transport of pollutants from distant sources contributing to regional haze.
- SO_2, NOx, and fugitive dust emissions from coal-fired power plants and coal mining and processing.
- Local sources of emissions associated with typical human activity (e.g., particulate emissions from wood burning).

3.2.3.2 Existing Air Pollutant Monitoring Data

The Uinta Basin is designated as attainment/unclassified for all criteria pollutants. Site-specific air quality monitoring data are not available for the MBPA; however, there are air pollutant monitoring stations elsewhere in the Uinta Basin. UDEQ-DAQ also estimates background air quality values as guidance for regulatory modeling of permitted sources to ensure NAAQS compliance. These background values are used in dispersion models by adding them to project-specific air quality impacts so an evaluation can be made on whether the source will meet NAAQS. The background values presented in **Table 3.2.3.2-1** are not equivalent to an EPA determination for non-compliance or nonattainment of the NAAQS, but rather an analysis of monitoring data to represent the MBPA for purposes of this EIS. **Table 3.2.3.2-1** lists the latest ambient air quality background values for those criteria pollutants and provides averaging times from which an NAAQS has been established. The values in the table come from the Air Quality Technical Support Document (AQTSD), which is included as an appendix to this EIS (refer to **Appendix B**, Section 3.2). Lead is not included in the table, because lead emissions from the Proposed Action and alternatives are *de minimis*. For additional information, see the discussion in **Section 3.2** of this EIS.

TABLE 3.2.3.2-1
PRE-PROJECT BACKGROUND AMBIENT AIR QUALITY IN THE UINTA BASIN[A]

Criteria Pollutant	Averaging Period(s)	Uinta Basin Background Concentration ($\mu g/m^3$)	NAAQS[b]
CO	1-hour 8-hour	2,641 1,657	35 ppm (40,000 $\mu g/m^3$) 9 ppm (10,000 $\mu g/m^3$)
NO_2	1-hour Annual	65.7 8.8	100 ppb (188 $\mu g/m^3$) 0.053 ppm (100 $\mu g/m^3$)
O_3	8-hour	208 (0.106 ppm)	0.075 ppm (147 $\mu g/m^3$)
PM_{10}	24-hour	18.7	150 $\mu g/m^3$
$PM_{2.5}$	24-hour Annual	19.7 6.6	35 $\mu g/m^3$ 12 $\mu g/m^3$
SO_2	1-hour 3-hour	20.1 14.3	75 ppb (196 $\mu g/m^3$) 0.5 ppm (1,300 $\mu g/m^3$)

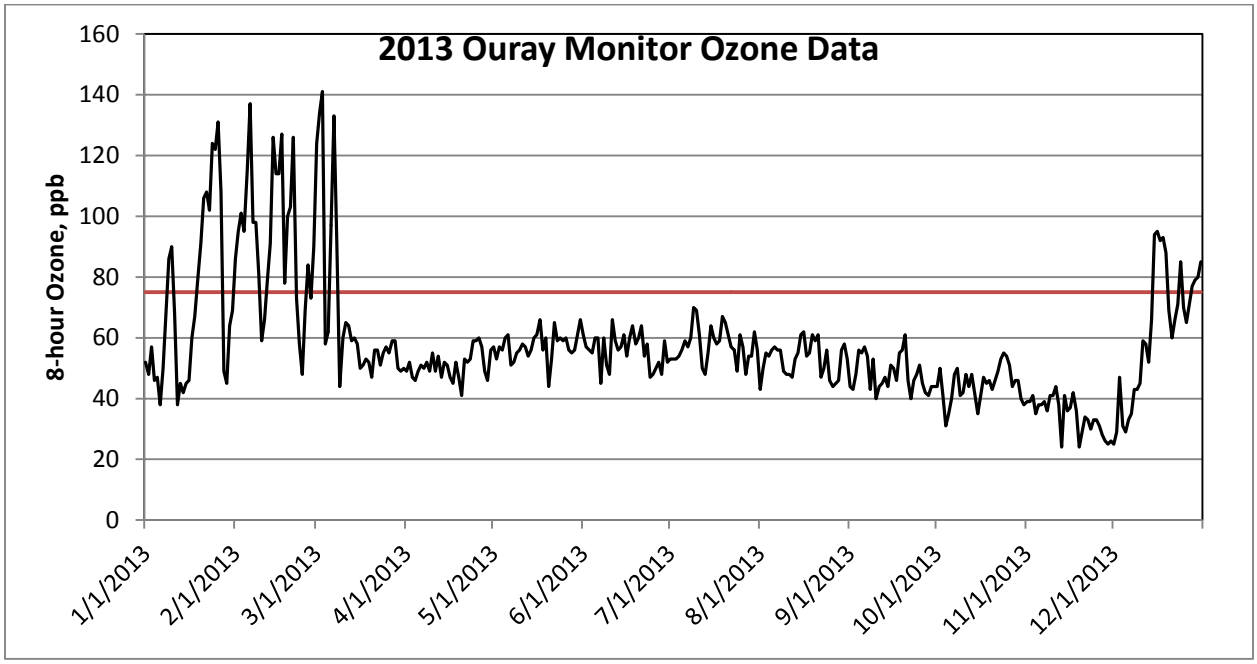
[a] See discussions in **Section 3.2** and **Appendix B** (Table 3-3 of the AQTSD) of this EIS for how the background values were established.
[b] See **Table 3.2.2.1-1**, which defines the NAAQS.

As shown in **Table 3.2.3.2-1**, the air monitoring background numerical value for ground-level ozone is higher than the NAAQS. Ozone is a secondary pollutant that is formed by a chemical reaction between NO_X and VOCs in the presence of heat and sunlight. As a result, it is generally known as a summertime air pollutant; however, ozone exceedances in the Uinta Basin only occur to date during the wintertime. Active ozone monitoring in the Uinta Basin began in the summer of 2009. Numerous monitoring sites

throughout the Basin have recorded exceedances of the 8-hour ozone standard during the winter months (UDEQ-DAQ 2014). No exceedances of the standard were recorded during the winter of 2011/2012, but exceedances did occur during the winter of 2012/2013 and 2013/2014 (UDEQ-DAQ 2014 & USEPA 2014). The ozone data in **Table 3.2.3.2-1** do not include all of the 2013/2014 winter ozone season, as those data have not been quality checked at this time. According to UDEQ-DAQ, the winter of 2012/2013 was favorable for ozone formation, unlike the winter of 2011/2012. The 2013 Uinta Basin Winter Ozone Study found that the highest readings in the Uinta Basin were measured at the Ouray monitor and reached a maximum of 142 ppm of ozone (UDEQ-DAQ 2014). The study is careful to point out that an exceedance does not necessarily indicate a violation of the NAAQS as the standards are based on the annual 4th high value (UDEQ-DAQ 2014).

Figure 3.2.3.2-1 displays daily maximum 8-hour ozone data from the Ouray monitor location in 2013 (USEPA 2014). The data show exceedances of ozone only in the winter months (January – March and December); thus, the ozone data is below the NAAQS of 0.075 ppm for the majority of the year. Precursor sources of ozone include motor vehicle exhaust and industrial emissions, gasoline vapors, some tree and other plant species emissions, wood burning, chemical solvents, and other sources.

FIGURE 3.2.3.2-1. 2013 OURAY MONITOR OZONE DATA



Source: USEPA 2014

The chemical and physical properties leading to this winter ozone formation is not currently well understood. Apparently, high concentrations of ozone are being formed under a "cold pool" process, whereby stagnant air conditions with very low mixing heights form under clear skies with snow-covered ground and abundant sunlight, which when combined with area precursor emissions (NO_X and VOCs) create intense episodes of ozone. This phenomenon has been observed in similar types of locations in Wyoming. Winter ozone formation is a newly recognized issue, and the methods of analyzing and managing this problem are still in development. Based on the emission inventories developed for Uintah County, the most likely dominant source of ozone precursors in the Uinta Basin are oil and gas operations in the vicinity of the monitors. The monitors are located in remote areas where impacts from other human

activities are unlikely to meaningfully contribute to this ozone formation. While ozone precursors can be transported large distances during the meteorological conditions under which this cold pool ozone formation is occurring, contributions of ozone precursors from long-range transport are expected to be *de minimis*. At the present time, ozone exceedences in this area seem to be confined to the winter months during periods of intense surface inversions and low mixing heights (USU EDL 2011).

Since 2010, the National Park Service (NPS) has been monitoring ozone concentrations in several national parks and monuments using portable and permanent instruments. Two of the reporting locations are the Canyonlands National Park and Dinosaur National Monument. There were four monitored exceedances in Dinosaur National Monument during the months of April through September in 2012, and two exceedances in Canyonlands National Park. These summertime exceedances, along with the summer ozone values reported in Dinosaur National Monument, were typical of ozone values monitored throughout the Intermountain West that followed regional patterns both in frequency and concentrations (NPS 2012).

The NPS Rocky Mountain Atmospheric Nitrogen and Sulfur (RoMANS) Study evaluated, observed, and modeled aerosol species concentrations and wet deposition (NPS 2009). The western-most study plot was Dinosaur National Monument, which was modeled and monitored. Field observations for the RoMANS Study were obtained during the summer of 2006. The goals of the RoMANS Study were to evaluate the meteorology, the relative contribution of emissions sources, and the relative contribution of emission locations leading to sulfur and nitrogen deposition at Rocky Mountain National Park and other model/study plots (including Dinosaur National Monument). Three gas-phase species (NH_3, HNO_3, and SO_2) and three particle-phase species (NH^{4+}, NO^{3-}, and SO_4^{-2}) were compared, along with total reduced nitrogen ($N^{(-III)} = NH^3 + NH^{4+}$), oxidized nitrogen ($N^{(V)} = HNO^3 + NO_3^-$), and total sulfur species ($S = SO_4^{-2} + SO_2$). Seasonal means and performance statistics were computed for the modeled and measured concentrations for each species at each of the sites and for each study period.

Air models typically underestimated ammonia and nitrates, where the observed values were approximately two times larger than for those modeled in the springtime period. To a smaller degree, however, sulfates and oxidized nitrogen were on the opposite end of this spectrum. Nitric acid was observed in much lower concentrations as compared to those found in the modeled estimates listed in the RoMANS Study, Volume 2, Table 5.38, p. 5-193 (NPS 2009).

In the RoMANS Study, precipitation chemistry shows a pH of 6.2 in springtime at Dinosaur National Monument, with relatively high concentrations of ammonia, chlorine, nitrates, and sulfates (concentrations among the top two or three of all twelve sites monitored). Nitrogen deposition dominated ammonium deposition in the Dinosaur National Monument region. Springtime concentrations of nitrates were highest in this region and decreased to the east of Dinosaur National Monument until reaching Rocky Mountain National Park and the Front Range. In Dinosaur National Monument, it was noted that aerosols are an important contributor to deposition in early springtime, when air quality can be worsened at times due to inversions, which cap pollution and increase the particulate matter in a stable atmosphere.

The RoMANS Study also concluded that the rate of nitrogen species deposition in Rocky Mountain National Park has changed over the last 20 years, with inorganic nitrate increasing by 10 to 50 percent and wet deposition of ammonium increasing by 50 to 90 percent. On the other hand, sulfur wet deposition has decreased by about 20 to 60 percent. The RoMANS Study stated that the rate of nitrogen deposition in Rocky Mountain National Park is currently about 50 percent greater than what is acceptable.

3.3 GEOLOGY AND MINERALS

3.3.1 Stratigraphy

Surface exposures in the MBPA are characterized by gravel and sandy pediment slopes, sandy washes, bluffs, cliffs, ledges, and ridges of sandstone. In some places, alluvial deposits of sand, gravel, and rounded cobbles cover these surface exposures, particularly on benches and mesa tops.

Rocks exposed in the MBPA include the Eocene and Oligocene Uinta Formation, the Eocene Green River Formation, and unconsolidated Quaternary alluvial and colluvial deposits (see **Figures 3.3.1-1** and **3.3.1-2 – Attachment 1**). The Utah Geological Survey (UGS) identifies the Uinta Formation, which ranges between approximately 300 to 900 feet in thickness at the ground surface, as covering the majority of the MBPA. The Uinta Formation is formed from river and lake deposits and contains abundant vertebrate fossils. The Uinta Formation may be further divided into two members in the MBPA: the B Member and the Lower Member. The B Member (also referred to as the Wagonhound member and identified as map unit Tub) is composed of light gray, light greenish gray, light brown, and light purple mudstone and claystone, with interbedded greenish gray, yellow, and brown fine-grained sandstone with minor conglomerate and tuffs (Sprinkel 2007). The Lower Member (map unit Tul) is similarly composed of light-gray calcareous mudstone interspersed with light-brown to brown sandstone that creates a banded appearance (Weiss et al. 2003).

In addition to members, formations may be divided into lithostratigraphic units. The sandstone and limestone stratigraphic unit of the Green River Formation (map unit Tgsl) is exposed in the canyon bottoms of Wells Draw in the southwestern portion of the MBPA. This stratigraphic unit is a transitional unit between the Uinta Formation and the saline facies of the Green River Formation. The rocks from this unit consist of beds of light-brown to brown, fine-grained sandstone, siltstone and shale interspersed irregularly with white to light-gray marlstone to create a banded appearance.

Quaternary unconsolidated deposits in the MBPA occur as floodplain and river channel alluvium (map unit Qal), colluvium (map unit Qc), mixed alluvium and colluvium (map unit Qac), undivided piedmont and basin alluvium (map units Qa and Qop), and alluvial fan deposits (Qaf). Floodplain and channel alluvium occurs along the channels of Pariette Draw, Castle Peak Draw, Petes Draw, Wells Draw, and several unnamed tributaries to Pariette Draw. This alluvium is up to 100 feet thick and consists of unconsolidated sand, silt, clay, and gravel.

Colluvium (Qc) consists of a heterogeneous mixture of boulders, gravel, cobbles, sand, and silt located on hill slopes. These deposits are up to 100 feet thick and locally grade into talus, landslide deposits, and other alluvial deposits. The mixed alluvium and colluvium (Qac) consists of unconsolidated mud, silt, sand, and gravel deposited along ephemeral stream channels and in areas of low topographic relief. The undivided alluvium (labeled as Qa in the eastern portion of the MBPA and Qop in the western portion) consists of variably consolidated, poorly to moderately sorted sand, gravel, cobbles, and boulders that are deposited on nearly flat bedrock surfaces. These deposits cover large areas on Eightmile Flat and Pariette Bench but are less than 6 feet thick.

Surficial bedrock outcrops within the MBPA do not contain hydrocarbons; however, hydrocarbons are present within deeper rock formations (see stratigraphic column in **Figure 3.3.1-2 – Attachment 1**). These formations are the targets of the deep drilling for the proposed project. The Eocene Wasatch Formation (map unit Tw) ranges from 800 to 2,000 feet thick and is a red, yellow, and light gray friable sandstone, siltstone, claystone, and conglomerate that intertongues with the overlying Douglas Creek and underlying

Flagstaff members of the Green River Formation (Sprinkle 2007). The Cretaceous Mesaverde Group (map units Kmvu and Kmvl) is between 2,500 feet to 3,400 feet in thickness and contains layers of light gray, fine grained, and cross-bedded sandstone with carbonaceous shale and coal beds. Underlying the Mesaverde Group, the Mancos shale (map unit Kms) is a dark gray, soft, slope-forming calcareous shale that contains beds of siltstone and bentonitic clay ranging from 4,500 to 5,550 feet in thickness. The undivided Frontier Sandstone, Mowry Shale, and Dakota sandstone formations (map unit Kfd) range from 250 to 775 feet thick and are light brown to yellow shales and sandstones that contain petrified wood, fossils, and coal beds (Sprinkel 2007).

3.3.2 Structure

Structural characteristics of the Uinta Basin formed during the early Eocene Laramide Orogeny, a time of mountain building in the western United States (Clark 1957). The Uinta Basin is a simple asymmetric syncline and is not highly deformed. The structural axis of the basin generally trends west to northwest and plunges gently to the northwest. The Duchesne River follows a course parallel to and 10 miles south of the structural axis. Bedrock on the southeastern and southwestern flanks of the basin dips about 1 to 15 degrees to the northeast and north. The northern flank of the basin dips about 10 to 35 degrees toward the southwest and is bounded by faults in many places.

The dominant structural trend within the central portion of the basin is east to west, possibly showing a relationship to the Uinta Mountains (Blackett 1996). The Duchesne fault system, which is a regional fault system, trends roughly along the northern boundary of the MBPA from east to west and parallels the trend of the Uinta Mountains to the north (Bryant 1992 and Sprinkel 2007). East and north of the MBPA, vertical fractures in the Uinta Formation are filled with the solid, brittle hydrocarbon Gilsonite.

The MBPA lies to the south of the structural axis in the southwest portion of the basin. Within the MBPA, bedrock dips approximately one to three degrees to the northeast toward the central portion of the basin. There is no evidence of folding in rocks at the surface.

3.3.3 Geologic Hazards

Seismic activity is common throughout Utah and is associated with the horizontal extension of the earth's crust in the Basin and Range Province (USSC 2008). More than 36,000 earthquakes have occurred in Utah since 1962, and 16 earthquakes greater than magnitude 5.5 have occurred since 1850. Although most earthquakes in Utah are associated with the Wasatch Fault and Intermountain seismic belt in central Utah, a 4.5-magnitude earthquake occurred in 1977 in the Uinta Basin, causing minor damage (UGS 1997, USSC 2008). Oil and gas production, as well as coal mining, have induced earthquakes as large as magnitude 4.9. According to the 1991 Uniform Building Code (UBC) seismic zone map, the MBPA is located within Seismic Zone 1, and indicates low potential earthquake damage to structures.

Additional potential geologic hazards within the MBPA include landslides, debris flows, and rock falls. Landslides result when slopes fail under the influence of gravity and may be shallow or deep-seated and can occur rapidly or over a period of days or weeks. Debris flows involve the movement of rocks, soil, and other debris by water and are geologically rapid events that may occur instantaneously or over a period of a few hours. Rock falls occur when basal support is removed from beneath a slope, such as when a stream undercuts the base of a rocky slope. According to the UGS, landslide susceptibility within the MBPA is classified as low to very low (Giraud and Shaw 2007). In addition, the UGS determined during an analysis of landslide maps in 2010 that landsliding was not identified within the MBPA (Elliott and Harty 2010a and 2010b).

Debris flows consist of colluvial material and water that are mobilized during large precipitation events and usually occur at the mouths of narrow side canyons. These debris flows represent the dominant method of mass wasting in the MBPA. The recurrence interval of the debris flow events is unknown. Some of the debris flows in the MBPA now support mature vegetation, while other debris flow events appear to have occurred more recently.

Steep slopes, characterized as slopes greater than 35 percent, are present within a small portion of the MBPA along the sides of the canyons in portions of Wells Draw and Gilsonite Draw.

3.3.4 Energy and Mineral Resources

The Uinta Basin is a source area for several energy-producing minerals. These minerals include oil and gas, coal, oil shale, bituminous sandstone and limestone ("tar sands"), and Gilsonite. In addition, known deposits of coarse sand and gravel as well as minor deposits of uranium, base metals, phosphate rock, and gypsum occur within the Uinta Basin.

3.3.4.1 Oil and Natural Gas

The Uinta Basin is currently one of the most active oil and natural gas producing areas in the onshore U.S. More than half of the total oil and natural gas wells drilled in Utah between 1911 and 2000 were drilled within the Uinta Basin. The Utah Division of Oil, Gas and Mining (UDOGM) recognizes productive oil and natural gas fields within the MBPA, including Monument Butte, Castle Peak, Eightmile Flat, and Pariette Bench fields (Utah AGRC 2013). Oil and natural gas fields of the Uinta Basin are depicted in **Figure 3.3.4.1-1 (Attachment 1)**.

Most of the historic energy production from the Uinta Basin is from the Tertiary Wasatch and Green River formations, and the distribution of the energy minerals is directly related to their depositional environment. The reservoir rocks in the Wasatch Formation consist of lake margin fluvial and alluvial plain sediments deposited by the Eocene Lake Uinta. This formation contains many buried stream channels that trend in a north-northwest direction and contain significant accumulations of natural gas.

The reservoir rocks of the Mesaverde Group are deltaic sandstone deposits. Gas production limitations exist for wells located within the Mesaverde Group and Wasatch Formation, due to the tight and thoroughly cemented sandstone beds that reduce the porosity and permeability of the reservoir (BLM 2003a). Deeper formations that have been reported to contain oil and gas accumulations include the Cretaceous Frontier/Dakota Formation and Mancos Shale, as well as the Jurassic Morrison, Entrada, and Wingate formations (Keighin et al. 1975, White River Resources Corporation 2004).

Newfield has estimated that some 5,400 million barrels of oil (MMbo) reserves are currently present within the Uinta Basin (Newfield 2012). In addition, the USGS estimates up to 21.4 trillion cubic feet (Tcf) of undiscovered gas resources are present in the Uinta-Piceance Basin (USGS DDS-69-B 2002).

As of 2011, more than 15,700 oil and gas wells have been drilled in the Uinta Basin (BLM 2012c). The 9,036 wells that are currently productive comprise 5,565 gas wells and 3,471 oil wells. Approximately 2,575 wells within the Uinta Basin have been plugged and abandoned.

The oil and gas fields within the MBPA have cumulatively produced nearly 58 MMbo and 177 billion cubic feet (Bcf) of natural gas as of March 2013 (UDOGM 2013b). A list of cumulative oil and natural gas production by field is presented in **Table 3.3.4.1-2**.

TABLE 3.3.4.1-2.
CUMULATIVE OIL AND NATURAL GAS PRODUCTION BY FIELD

Production Field	Cumulative Oil Production (barrels)	Cumulative Natural Gas Production (Mcf[a])
Castle Peak	63,996	169,286
Monument Butte	56,167,232	127,739,094
Eightmile Flat	524,115	6,702,197
Pariette Bench	1,209,106	42,185,586
Total Production	**57,964,449**	**176,796,163**

[a] thousand cubic feet

3.3.4.2 Gilsonite

In addition to oil and gas reserves, the Uinta Basin also contains deposits of Gilsonite. Gilsonite, also referred to as asphaltum, uintaite, or uintahite, is composed of black, brittle hydrocarbon resins that resemble tar or asphalt. Gilsonite has been used in high-grade varnishes, lacquers, paints, acid proofing, insulating plastics, inks, and mastic (BLM 2002a). The deposits occur in vertical to near-vertical, long, thin, northwest-trending veins that occur primarily in the Green River, Uinta, and lower Duchesne River Formations. The oil shale beds of the Green River Formation are the hydrocarbon source for these Gilsonite veins. The veins are about 0.5 to 7 miles long and vary in width from a few inches to about 18 feet (BLM 1984). Gilsonite veins are abundant in the thickest sandstone units located in the lower Uinta Formation, which were deposited during the late Eocene waning of Lake Uinta (BLM 2002a). These deposits are mostly located to the east of the MBPA and are mined primarily by shaft, stoping, and open pit methods (Cashion 1973).

Known Gilsonite veins are present within the MBPA on Eightmile Flat and Castle Peak Bench. Sprinkel (2007) has mapped a series of four veins about 1 mile long on Eightmile Flat. These veins are located in Sections 10, 17, 20, 21, 23, and 24 of Township 9 South, Range 18 East. Two veins totaling about 2.5 miles long are present on Castle Peak Bench, which is located in Township 8 South, Range 17 East and Township 9 South, Range 17 East (Bryant 1992). Gilsonite vein locations are presented above in **Figure 3.3.4.1-1 (Attachment 1)**.

3.3.4.3 Tar Sands

Tar sands are generally described as sedimentary rock or loosely cemented sedimentary deposits that function as a reservoir of heavy hydrocarbon residues. These residues include bitumen, a class of solid and semi-solid hydrocarbons that are fusible and soluble in carbon bisulfide and exhibit chemical characteristics similar to petroleum. Bitumen is thought to be derived from crude oil that accumulated in conventional petroleum reservoirs near the land surface that were later breached, which allowed the volatile components of the crude oil to escape (Blackett 1996). Other heavy hydrocarbon residues that may be present in the

sedimentary reservoir include tar and degraded oils that have lost their volatile components. In the case of loose unconsolidated sands, the bitumen fills the pore spaces to form cement (Pruitt 1961). Other porous rocks such as fractured carbonates may also contain bitumen, and therefore may be classified as tar sand.

Deposits of tar sands are located throughout the Uinta Basin (Blackett 1996) and are thought to exceed 8 billion bbls of oil (Ritzma 1979). Pursuant to the Combined Hydrocarbon Leasing Act of 1981, Congress divided select tar sand deposits in the Uinta Basin into seven Special Tar Sand Areas (STSAs). The Pariette STSA is located within the Project Area and is present on Pariette Bench, which is located in Township 8 South, Range 16 East; Township 8 South, Range 17 East; Township 9 South, Range 17 East; and Township 8 South. Range 18 East. The STSAs are illustrated in **Figure 3.3.4.1-2 (Attachment 1)**. Other limited areas with lesser quality tar sand deposits are also located throughout the Uinta Basin (Blackett 1996).

The Pariette deposit consists of numerous scattered outcrops of bitumen-saturated sandstone units of the Uinta Formation that extend approximately 20 miles intermittently along Pariette Bench in proximity to the known Gilsonite veins. Ritzma (1979) estimated that the Pariette deposit contains approximately 12 to 15 million bbls of bitumen that vary from weak to rich in saturation, with some dry occurrences.

3.3.4.4 Oil Shale

Oil shale is a compact, fine-grained sedimentary rock containing large quantities of organic matter that yields oil when distilled (BLM 2003a). Oil occurs as kerogen within marlstones of the Parachute Creek Member of the Green River Formation, which is present beneath the MBPA. The Mahogany Oil Shale Zone is the most notable oil shale unit of the Green River Formation, and the most likely to be mined at some point in the future. The Mahogany Zone varies in thickness throughout the Uinta Basin and generally thickens towards the south (USGS DDS-69-BB 2010).

Pursuant to the Combined Hydrocarbon Leasing Act of 1981, Congress designated certain areas within the Uinta Basin that were known to contain deposits of oil shale as Known Oil Shale Leasing Areas (KOSLAs). These areas have a minimum oil shale yield of 25 gallons per ton, a minimum Mahogany Zone thickness of 25 feet, and a maximum depth of 3,000 feet below the ground surface. KOSLAs are present within the Eightmile Flat portion of the MBPA, which is located in Township 9 South, Range 17 East; Township 9 South, Range 18 East; and Township 9 South, Range 19 East. The KOSLAs are represented in **Figure 3.3.4.1-2 (Attachment 1)** (BLM 2002a).

3.3.4.5 Other Leasable, Locatable, and Salable Minerals

Known deposits of coarse sand and gravel occur throughout the MBPA in association with alluvial deposits from the Green River, Wells Draw, and Castle Peak Draw (BLM 2002a). Small quantities of sand and gravel are mined along the Green River from several ephemeral washes and from a series of gravel pits located in the western portion of the MBPA. A formerly active pit authorized as a "Free Use Permit" to the BLM is found in the northwestern portion of the MBPA, which is located in Section 25, Township 8 South, Range 16 East and Section 30, Township 8 South, Range 17 East (BLM 2002a). The Free Use Permit for this pit expired in 2010; however, the pit has not been closed and reclaimed. In addition, Duchesne County has processed 43 applications for new gravel pits on private lands or minerals between 2008 and 2012 (PDEIS Comment #28 submitted by Mike Hyde, Community Development Administrator for Duchesne County, on August 27, 2013).

Minor deposits of uranium, base metals (copper), phosphate rock, and gypsum also occur within the Uinta Basin. Base metals, gypsum, and phosphate rock occur in small deposits near the Uinta Mountains to the

north of the MBPA. Some uranium exists within the carbonaceous units of the Mesaverde Group and Uinta Formation underlying the MBPA; however, with the exception of existing phosphate mining activities in Uintah County, little interest or development potential exists for any of these materials in the Uinta Basin (BLM 2002a and BLM 1984).

3.4 PALEONTOLOGICAL RESOURCES

Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered nonrenewable resources, because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced.

Fossils on federal lands are protected under provisions of the Federal Land Policy and Management Act (FLPMA), as amended, 43 USC 1737(b), Public Law 94-579; the Omnibus Public Land Management Act of 2009, Subsection D, Section 6302, Public Law 111-011; and subsequent federal regulations in 43 CFR 3802 and 3809. Paleontological resources on State of Utah lands are afforded protections under provisions of Chapter 73 of the Utah State Code.

3.4.1 Regional Overview

The study area for paleontological resources is the MBPA. Sediments that today comprise the Uinta Mountains were first deposited between 1,000 and 600 million years ago. During that time, more than 25,000 feet of shallow water, sandstone, and shale accumulated from westward-flowing stream deposits. The basin filled and major deposition halted, although some thickening of the sedimentary deposits continued (BLM 2012b, p. 3-46). These deposits were then uplifted during the Laramide Orogeny, a time of mountain building associated with the latest Cretaceous period and Paleocene epoch that formed the Uinta Mountains and the southerly adjacent synclinal Uinta Basin (Rasmussen et al. 1999 in BLM 2012b, p. 3-46). These stratified sedimentary deposits have been subsequently classified as the Uinta, Duchesne River, and Green River Formations. For a more detailed discussion of the geology within the MBPA, refer to **Sections 3.3.1** and **3.3.2**.

The Uinta Basin defines a region that is well known for its geologic history and paleontological importance. The region preserves a discontinuous but richly diversified fossil record spanning at least 535 million years from the Cambrian period to the Pleistocene epoch. The Uinta, Duchesne River and Green River Formations and their fossils are important not only for their taxonomic diversity, but also because they document the Paleocene climatic change. During this period, the conditions changed from a tropical and subtropical climate during the deposition of the Green River Formation to a more arid and cooler savannah climate during the deposition of the Uinta Formation (BLM 2005a, p 3.3-1). Fossils mammals from the Uinta Formation are used to define the Uintan Land Mammal Age. More than 100 species of animals, birds, turtles, and other reptiles, amphibians, and fishes are known from this formation. The Uinta Formation consists of two distinct member levels: the upper Myton member and the lower Wagonhound member (Winterfeld 2011). Due to very limited exposures within the MBPA, the Green River Formation has produced plant and invertebrate remains (i.e., plants, invertebrates, fishes, turtles, crocodiles, bird bones, mammal bones, and teeth and mammal tracks) that are considered of major importance. The Duchesne Formation does not occur within the MBPA.

3.4.2 Resource Assessment Guidelines

Paleontological resource classification is a ranking of areas and geologic units according to their potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. These rankings are used in land use planning, as well as for identifying areas that may warrant special management and/or special designations. Using published geologic maps (Bryant 1992, Rowley et al. 1985) and the results of literature searches, the Area of Potential Effect (APE) for this EIS was classified using the Potential Fossil Yield Classification (PFYC) system for paleontological resources, per BLM Instruction Memorandum (IM) No. 2008-009 (BLM 2007b). The PFYC system that categorizes paleontological resources by class is discussed below.

The PFYC system classifies geologic units on the basis of relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils, and the sensitivity to adverse impacts. A higher class number indicates a higher potential for fossils. The classification should be applied at the geologic formation or member level. The system provides baseline guidance to assess and mitigate impacts to paleontological resources. The classification should be an intermediate step in the analysis and should be used to assess additional mitigation needs (BLM 2012b).

The classes present in the MBPA are described below.

- Class 2: Low potential for fossils such as alluvial deposits.
- Class 3: Moderate or unknown potential for fossil content that varies in significance.
- Class 4: High potential for occurrence of fossils.
- Class 5: Very high potential for highly fossiliferous geologic units that consistently and predictably produce vertebrate or important invertebrate or plant fossils.

3.4.3 Resource Assessment Overview

Using the PFYC System, the paleontologic sensitivity of the five primary geologic formations within the MBPA are provided in **Table 3.4.3-1**. To date, approximately 3,719 acres have been involved with historic and ongoing surface disturbing oil and gas activities within the PFYC units. The alluvial and colluvial deposits of the Holocene age are too young to contain fossils and are not discussed further in this document. Thus, the remaining four units, the river terrace and older pediment deposits of the Pleistocene age and the Uinta and Green River Formations of the Eocene age, have the potential to contain scientifically important fossils.

TABLE 3.4.3-1
SUMMARY OF PALEONTOLOGICAL RESOURCE INFORMATION
WITHIN THE MBPA, USING THE PFYC SYSTEM

Geologic Unit	Age	Typical Fossils	PFYC	Calculated Existing Surface Disturbance by PFYC
Quaternary alluvium and colluvium	Holocene	None	Class 2	527[1]
River terrace deposits	Pleistocene	Vertebrates[2]	Class 3	0
Older pediment deposits	Pleistocene	Vertebrates[2]	Class 3	297

Geologic Unit	Age	Typical Fossils	PFYC	Calculated Existing Surface Disturbance by PFYC
Uinta Formation	Eocene	Vertebrates, invertebrates	Class 5	2,867
Green River Formation	Eocene	Invertebrates, invertebrates, plants	Class 5	29
TOTAL				3,719

[1] Although this unit is too young to contain fossils, the calculated existing surface disturbance is included for completeness.

[2] Few records of fossil localities of Pleistocene age are known within the MBPA.

The USGS has 557 fossil localities on file for the four core USGS quadrangles within the MBPA: Myton SW, Myton SE, Pariette Draw SW, and Uteland Butte. The large number of known localities demonstrates the paleontological importance of the MBPA. Current data reveals fossils are found primarily in badland topography, that is, exposures of eroded and incised mudstone and small sandstone units primarily involving the Uinta and Green River Formations. Conversely, relatively un-dissected areas within the MBPA are unlikely to yield fossils because of alluvium cover.

3.5 SOILS

Detailed soil mapping was conducted by the Natural Resources Conservation Service (NRCS). The Soil Survey of Uintah Area, Utah – Parts of Daggett, Grand, and Uintah Counties (Uintah Survey) is the primary source of information regarding soils within the MBPA (NRCS 2003). Detailed mapping has not been completed for that portion of the MBPA that is located within Duchesne County; however, the Price NRCS office has conducted draft soil mapping, which is available for this area (NRCS 2012a). The Uintah and Duchesne County soil survey data have been supplemented by additional information available on the NRCS Web Soil Survey and Official Soil Series Descriptions databases (NRCS 2012b and 2012c).

The development of soils is governed by many factors, including climatic conditions (e.g., the amount and timing of precipitation, temperature, and wind), the parent material that the soil is derived from, topographic position (e.g., slope, elevation, and aspect), geomorphic processes, and vegetation type and cover. Soils within the MBPA developed on structural benches, ridges, hills, alluvial fans, erosional remnants, floodplains, strath terraces, and alluvial flats. Soil textures include sandy loam, gravelly sandy loam, clay loam, cobbly loam, silty clay loam, channery loam, and variations of these types. Rock outcrop is also common.

Figure 3.5-1 (Attachment 1) shows the soil map units within the MBPA. Each detailed soil map unit consists of one or more general soil series that occur in association with each other. **Table 3.5-1** lists the soil map units that are present within the MBPA. These map units cover areas as small as 14 acres to as large as 17,550 acres. **Appendix C** summarizes the soil textures, parent materials, landforms, slopes, depth class, drainage and runoff classification, and other factors of the soil map units within the MBPA that are relevant to potential management concerns.

TABLE 3.5-1
SOIL MAP UNITS WITHIN THE MBPA

Soil Map Unit	Acres[1]	Percent MBPA
Badland-Rock outcrop complex, 1 to 100 percent slopes	1,177	1.0
Boreham loam, 0 to 2 percent slopes	3,583	3.0
Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes	11,174	9.5
Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes	8,138	6.9
Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes	23	0.0
Cakehill sandy loam, 2 to 5 percent slopes	1,824	1.5
Cheeta-Rock outcrop complex, 30 to 80 percent slopes	871	0.7
Green River Loam, 0 to 2 percent slopes, occasionally flooded	14	0.0
Ioka-Cadrina complex, 2 to 25 percent slopes	1,441	1.2
Ioka gravelly sandy loam, 0 to 3 percent slopes	263	0.2
Ioka very gravelly sandy loam, 4 to 25 percent slopes	1,928	1.6
Jenrid-Green River complex, 0 to 2 percent slopes	554	0.5
Jenrid sandy loam, 0 to 2 percent slopes	2,355	2.0
Kilroy loam, 1 to 4 percent slopes	8,381	7.1
Leebench sandy loam, 0 to 2 percent slopes	2,572	2.2
Leeko loam, 0 to 4 percent slopes	1,417	1.2
Mikim loam, 2 to 5 percent slopes	980	0.8
Mikim silt loam, 2 to 4 percent slopes	24	0.0
Motto-Muff-Rock outcrop complex, 2 to 25 percent slopes	1,988	1.7
Motto-Rock outcrop complex, 2 to 25 percent slopes	17,175	14.5
Motto-Uffens complex, 2 to 25 percent slopes	997	0.8
Muff gravelly sandy loam, 2 to 8 percent slopes	4,201	3.6
Nakoy loamy fine sand, 1 to 5 percent slopes	1,485	1.2
Pariette gravelly sandy loam, 2 to 8 percent slopes	4,262	3.6
Pherson-Hickerson complex, 1 to 8 percent slopes	302	0.3
Rock outcrop	67	0.1
Shotnick sandy loam, 2 to 4 percent slopes	320	0.3
Smithpond-Montwel-Badland association, 3 to 25 percent slopes	2,574	2.2
Uffens-Rock outcrop complex, 15 to 25 percent slopes, eroded	1,665	1.4
Uffens loam, 3 to 8 percent slopes	7,395	6.3

Soil Map Unit	Acres[1]	Percent MBPA
Uffens sandy loam, 0 to 2 percent slopes	1,857	1.6
Umbo silty clay loam, 0 to 2 percent slopes	1,288	1.1
Walknolls-Rock outcrop complex, 2 to 50 percent slopes	3,271	2.8
Walknolls-Uendal association, 2 to 25 percent slopes	17,550	14.8
Walknolls extremely channery sandy loam, 4 to 25 percent slopes	3,749	3.2
Water	177	0.1
Unidentified	1,176	1.0
Totals	**118,218**	**100.0**

[1] Total acreage estimates are based on GIS-software calculations and may not equal total acreage by soil map unit due to rounding, removal of overlapping development, and minute boundary discrepancies. GIS-based calculations are considered more accurate than estimates calculated using simple addition, and therefore will be used throughout this document.

3.5.1 Soil Characteristics of Greatest Management Concern

For evaluation of potential environmental impacts to soils, several physical, chemical, and interpretive soil characteristics were evaluated within the MBPA. These soil characteristics include water erosion potential, wind erodibility, available water supply, rooting depth, sodium adsorption ratio (SAR), restoration potential, and the presence of biological soil crusts (BSCs).

3.5.1.1 Water Erosion Potential

Water erosion potential can vary widely among soil units within a given area. This potential is dependent on the particle size distribution of the soil, the slopes on which it is found, and the amount and type of vegetative cover. The NRCS typically rates each of the soil units according to its whole soil water erosion potential (Kw), which indicates the general susceptibility of a soil to sheet and rill erosion. The value of Kw ranges from 0.02 to 0.69. The higher the Kw value of a soil type, the more susceptible the soil type is to sheet and rill erosion. Erosion hazards become critical issues when protective vegetation is removed during and following activities such as access road and well pad construction. Typically, soils found on steeper slopes and badland areas have a higher water erosion potential than those found on gentler slopes.

The NRCS has provided whole soil water erosion potentials for 88 percent of the MBPA (NRCS 2012b and 2012c). Approximately 67,073 acres (57 percent) of the soils within the MBPA have erosion potentials of 0.15 or less, which indicate low to moderate water erosion potential in these areas. Approximately 36,886 acres (31 percent) of the soils within the MBPA are rated between 0.20 and 0.55, indicating a moderate to high water erosion potential. The remaining 14,259 acres (12 percent) of the MBPA have not been rated for whole soil water erosion potential. This portion of the MBPA includes rock outcrop (map unit 193), Uffens-Rock outcrop complex, 15 to 25 percent slopes (map unit CZE2), Braf-Rock outcrop-Uffens complex, 5 to 50 percent (map unit EZF2), unidentified soils, and open water (map unit 258).

3.5.1.2 Wind Erodibility

In addition to erosion by water, soils are also susceptible to erosion by wind. Wind erosion is closely correlated with the soil texture of the surface layer, the size and durability of surface clods, the proportion of rock fragments, and the presence of organic material. Soils with more fines are at greater risk of wind

erosion, and soils with more gravel and/or stones have a lower risk of wind erosion. In addition, soil moisture and the presence of frozen soil layers also affect a soil's susceptibility to wind erosion. The NRCS estimates wind erodibility with an index of tons per acre per year that could be lost to wind erosion (NRCS 2012c).

The NRCS has provided wind erodibility indices for 99 percent of the MBPA (NRCS 2012b and 2012c). Approximately 24,816 acres (21 percent) of the soils within the MBPA have a wind erodibility index of 0 tons per acre per year. Approximately 92,049 acres (78 percent) of the soils within the MBPA have a wind erodibility index between 48 and 134 tons per acre per year, with an average of 77 tons per acre per year. The remaining 1,353 acres (1 percent) of the MBPA have not been rated for wind erodibility. These unrated acreages include unidentified soils and open water.

3.5.1.3 Available Water Capacity

Available water capacity is the total volume of water in a soil that is available for use by plants. This parameter is commonly estimated as the amount of water held between field capacity and the wilting point, and is measured in inches. Plants need a soil water capacity value greater than 4 inches to sustain root viability between rainfall events or periods of irrigation and to buffer the plants root environment against periods of water deficit. Available water capacity values less than 4 inches results in stressed plants and higher erosion potential. Soil properties that reduce the available water capacity are a high proportion of rock fragments, low organic matter content, high bulk density, and sandy soil textures (NRCS 1998).

The NRCS has provided available water capacity values for 84 percent of the MBPA (NRCS 2012b and 2012c). Approximately 64,185 acres (54 percent) of the soils within the MBPA have available water capacity values greater than 4 inches. Approximately 35,349 acres (30 percent) of the soils within the MBPA have available water capacity values less than 4 inches. The remaining 18,684 acres (16 percent) of the MBPA have not been rated for available water capacity. This portion of the MBPA contains Smithpond-Montwel-Badland association, 3 to 25 percent slopes (map unit 142), Rock outcrop (map unit 193), Uffens-Rock outcrop complex, 15 to 25 percent slopes (map unit CZE2), Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (map unit EZF2), Mikim loam, 2 to 5 percent slopes (map unit MaB), Cheeta-Rock outcrop complex, 30 to 80 percent slopes (map unit RAL), unidentified soils, and open water.

3.5.1.4 Rooting Depth

The rooting depth of a soil may be determined by identifying the depth of the nearest restrictive soil layer. In the case of rooting depth, a restrictive layer is a nearly continuous layer that has one or more physical, chemical, or thermal properties that greatly impede the movement of water and air through the soil, restrict roots, or otherwise provide an unfavorable root environment. Examples include bedrock, cemented layers, dense layers, and frozen layers (NRCS 2012c).

The NRCS has provided depths to the nearest restrictive soil layer for 99 percent of the MBPA (NRCS 2012b and 2012c). Approximately 50,197 acres (43 percent) of the soils within the MBPA have restrictive layers greater than 200 inches below the ground surface. Approximately 66,668 acres (56 percent) of the soils within the MBPA have restrictive layers between 0 to 48 inches below the ground surface. The remaining 1,353 acres (1 percent) of the MBPA have not been assigned depths to the nearest restrictive layers. These unrated acreages include unidentified soils and open water.

3.5.1.5 Sodium Adsorption Ratio

SAR is a measure of the amount of sodium relative to calcium and magnesium in soil water. Soils with SAR values greater than 13 are considered sodic and may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure (NRCS 2012c).

The NRCS has provided SARs for 99 percent of the (NRCS 2012b and 2012c). Approximately 77,439 acres (66 percent) of the soils with the MBPA have SARs less than 13. Approximately 39,426 acres (33 percent) of soils within the MBPA have SARs greater than 13 and are considered sodic. The remaining 1,353 acres (1 percent) of the MBPA have not been rated for SARs. These unrated acreages include unidentified soils and open water.

3.5.1.6 Restoration Potential

Restoration potential rates a soil for its ability to recover from degradation by restoring functional and structural integrity after disturbance. This factor is dependent on the soil structure, pH conditions, adequate precipitation for recovery, and soil salinity, among other factors. Excessive salinity (salt content) or sodicity (sodium content) can inhibit the growth of desirable vegetation, and therefore successful restoration.

A "high potential" rating indicates that the soil has features that are very favorable for recovery, and good performance can be expected. A "moderate potential" rating indicates that the soil has features that are generally favorable for recovery and fair performance can be expected. A "low potential" rating indicates that the soil has one or more features that are unfavorable for recovery, and poor performance can be expected (NRCS 2012c).

The NRCS has provided restoration potential ratings for 87 percent of the MBPA (NRCS 2012b and 2012c). Approximately 99,228 acres (84 percent) of the soils within the MBPA are rated low for restoration potential. Approximately 3,554 acres (3 percent) of the soils within the MBPA are rated moderate for restoration potential. The remaining 15,436 acres (13 percent) of the MBPA were not rated for restoration potential. This portion of the MBPA includes Badland-Rock outcrop complex, 1 to 100 percent slopes (map unit 12), Rock outcrop (map unit 193), Uffens-Rock outcrop complex, 15 to 25 percent slopes (map unit CZE2), Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (map unit EZF2), unidentified soils, and open water.

3.5.1.7 Biological Soil Crusts

BSCs occur within the MBPA on the surface of mostly undisturbed soils that support the dominant salt-desert shrubland, sagebrush shrubland, grassland, and to a lesser extent pinyon-juniper woodland vegetation types. BSCs are composed of various organisms, including bacteria, green algae, lichens, mosses, and micro-fungi, that symbiotically form a rough carpet on the surface and a soil-binding matrix below (Belnap et al. 2001). On the Colorado Plateau, in which the MBPA is located, the predominant cyanobacterial-lichen soil crust often provide up to 10 percent of the living cover (Belnap and Gardner 1993). As a group, BSCs are adaptable to a full range of soil types, which include shallow to deep, heavy to light textures, moist to drier conditions, and slopes ranging from level to steep. Given this adaptability, soil crusts are expected to occur across much of the MBPA. Steeper slopes supporting mostly unstable soils and those areas lacking soil cover, such as badlands and rock outcrops, generally do not support BSCs. BSCs typically

occupy interspaces of open ground between higher vascular plants or below their canopies (Belnap and Gardner 1993).

In semi-arid and arid environments, BSC cover fixes carbon and nitrogen for other plants, reduces surface reflection, raises soil temperature, increases water infiltration rates, and stabilizes soils by reducing water and wind erosion (Belnap et al. 2001). Nitrogen fixation improves soil fertility by increasing availability of nitrogen in typically nutrient-poor systems such as the semi-arid landscapes within the MBPA (Muscha and Hild 2006; Belnap and Garner 1993). Because soils with developed BSCs generally are dark in color, they absorb more of the sun's energy as heat, which can positively increase microbial activity, increase plant nutrient uptake, promote higher plant seed germination of native vascular plants adapted to BSCs, and increase seedling growth rates. The roughened surface produced by the raised expression of the BSCs can act as detention structures for water and affect increased water infiltration to the benefit of both BSCs and higher plants in the cool deserts of the Colorado Plateau (Belnap et al. 2001). Cyanobacterial-lichen BSCs of the Colorado Plateau entrap and bind soil particles together. This process increases the size of soil aggregates, which in turn increases their resistance to the erosive forces of wind and water (Belnap et al. 2001; Belnap and Gardner 1993).

Threats to BSCs generally arise from damage or loss of BSCs due to disturbance, including fire, drought, invasive and non-native plant infestations, livestock trampling, human foot traffic, motorized vehicle passage, and blading or excavation of the soil surface and BSCs as part of construction activities (Belnap et al. 2001). The rate of natural recovery of BSCs in disturbed areas is dependent on the type and severity of disturbance and the availability of BSCs to recolonize the affected areas.

3.6 WATER RESOURCES

3.6.1 Regional Overview

The MBPA lies within an arid to semi-arid region in the Uinta Basin of northeastern Utah. The North Slope of the Uinta Basin is drained by the Green River, which flows along the southeastern corner of the MBPA.

3.6.2 Surface Water Resources

The MBPA lies largely within the Lower Green-Desolation Canyon basin, although a small amount of the Upper South Myton Bench-Duchesne River basin also lies in the northeastern corner of the MBPA. The region in and around the MBPA is mostly drained by intermittent/ephemeral streams. However, Pariette Draw and the Green River are considered the major perennial streams draining most of the MBPA.

3.6.2.1 MBPA Drainages

The MBPA is located within three subbasins of the Desolation Canyon basin (Upper Pariette Draw, Lower Pariette Draw, and Sheep Wash-Green River subbasins) and one subbasin of the Lower Green-Duchesne basin (Antelope Creek subbasin). **Figure 3.6.2.1-1 (Attachment 1)** depicts the drainage basins within the MBPA. **Table 3.6.2.1-1** provides a summary of the area of each subbasin within the MBPA.

TABLE 3.6.2.1-1.
SUBBASIN DRAINAGES WITHIN THE MBPA

Subbasin Name	Drainage Area in MBPA (acres)	Percentage of MBPA	Total Drainage Area (acres)
Upper Pariette Draw	40,805	34.1	10,0548
Lower Pariette Draw	68,163	56.9	12,1147
Sheep Wash–Green River	10,624	8.9	13,5941
Antelope Creek	151	0.1	10,7919
Total	**119,743**	**100.0**	**46,5555**

3.6.2.2 Other Water Resources

The Lower Duchesne River Wetlands Mitigation Project lies approximately two miles north of the MBPA and is approximately 4,800 acres in size. The Sand Wash Recreation Area lies approximately nine miles south of the MBPA.

3.6.2.2.1 Upper Pariette Draw Subbasin

The Upper Pariette Draw subbasin includes the drainage configuration of Gilsonite Draw to Wells Draw to Pleasant Valley Wash to Pariette Draw to the confluence with Castle Peak Draw (see **Figure 3.6.2.1-1 – Attachment 1**). The headwaters of Gilsonite Draw are located south and west of the southwestern portion of the MPBA. Gilsonite Draw flows northward to its confluence with Wells Draw just north of the MBPA boundary. The headwaters of Wells Draw are located in the Bad Land Cliffs and Wells Draw Road areas east of the Gilsonite Draw headwaters, at an elevation of about 7,000 feet amsl. Wells Draw flows northward for approximately 16 miles to its confluence with Pleasant Valley Wash, which eventually intersects with Pariette Draw. Castle Peak Draw joins Pariette Draw near the northeastern MBPA boundary. The lower segments of Wells Draw show evidence of deep channel incision, unstable banks, and a lack of riparian vegetation development.

3.6.2.2.2 Lower Pariette Draw Subbasin

This subbasin includes the drainage configuration of Big Wash to Castle Peak Draw to Pariette Draw. Castle Peak Draw is an intermittently flowing drainage with a wide and sinuous channel. Very little riparian vegetation grows in the floodplain, except along the lower two miles of the channel just above the confluence with Pariette Draw.

The Pariette Wetlands, an important man-made wetland created to support waterfowl in an otherwise arid region, are supported by surface water diversions from Pariette Draw. Several large reservoirs upstream catch spring runoff and provide a steady year-round flow to support agriculture and the created wetlands. A canal also diverts water from the Duchesne River to support flow in Pariette Draw. Flow is diverted from Pariette Draw to 25 man-made ponds to support waterfowl habitat (BLM 2012e).

Characteristics of the wetlands vegetation cover type are described in **Section 3.7.1.3**. Recreational amenities associated with the Pariette Wetlands ACEC are discussed in **Section 3.13.2.5**. Additional information about the Pariette Wetlands ACEC can be found in **Section 3.15.1**.

3.6.2.2.3 Sheep Wash-Green River Subbasin

This subbasin includes Sheep Wash and Petes Wash (which drains into Sheep Wash in the northeastern portion of the MBPA), as well as Desert Spring Wash, Four Mile Wash, and Sand Wash (which all drain directly to the Green River). The Green River is the main river to which all water drains in this subbasin; that is, all water from each of the other subbasins eventually drains to the Green River. Each of the washes in this subbasin is intermittently flowing, and no gauging data are available.

3.6.2.2.4 Antelope Creek Subbasin

While a portion of the Antelope Creek subbasin lies within the MBPA boundary, the total acreage is very small (approximately 20 acres). No development is proposed in this subbasin. Therefore, the Antelope Creek subbasin will not be discussed further in this analysis.

3.6.2.3 Surface Water Occurrence

There are approximately five miles of perennial streams (Pariette Draw) and approximately 1,040 miles of intermittent stream in the MBPA, as identified by USGS 1:24,000 scale topographic maps. However, most of the intermittent streams shown on USGS maps in the MBPA do not flow regularly or for a portion of each year, and therefore are more accurately to be considered ephemeral streams or washes. The Green River, the largest river in the Uinta Basin, abuts the extreme southeastern corner of the MBPA. Average annual flow in the Green River is about 4,064,290 acre-feet at Ouray, Utah (BLM 2006a). **Figure 3.6.2.1-1 (Attachment 1)** shows that Pariette Draw feeds into the northeastern part of the MBPA and is fed by ephemeral and intermittent streams that originate within the MBPA boundary.

3.6.2.4 Surface Water Quality

Water quality use designations for the State of Utah have been established for all waters of the state, which includes some of the perennial and intermittent/ephemeral streams in the MBPA (UDEQ-DWQ 2002). According to the UDEQ, designations for streams with established beneficial uses specific to the MBPA include the following:

- 1C-Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- 2A-Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.
- 2B-Protected for infrequent primary contact recreation. Waters with this designation also are protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.
- 3B-Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
- 3D-Protected for waterfowl, shore birds, and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
- 4-Protected for agricultural uses, including irrigation of crops and stock watering.

The Division of Water Quality (DWQ) has completed beneficial use assessments for the Green River and Pariette Draw (UDEQ-DWQ 2004a). **Table 3.6.2.3-1** lists the use designations that have been assigned to perennial and intermittent/ephemeral streams in the MBPA.

TABLE 3.6.2.3-1
BENEFICIAL USE DESIGNATIONS FOR STREAMS IN THE MBPA

Use Designations	Stream
1C, 2A, 3B, 4	Green River
2B, 3B, 3D, 4	Pariette Draw and tributaries from confluence with Green River to headwaters

3.6.2.4.1 Surface Water Quality Standards

The DWQ has established water quality standards that are contained in Utah Administrative Code, Rule R317-2. These standards were enacted to protect the waters of Utah and to improve the quality for each designated beneficial use. **Table 3.6.2.3.1-1** lists water quality standards that are pertinent to the MBPA.

TABLE 3.6.2.3.1-1
WATER QUALITY STANDARDS FOR BENEFICIAL USES PERTINENT TO THE MBPA

Domestic Water Uses		Recreation Uses		Aquatic Wildlife Uses	Agricultural Uses	
Parameter	**1C**	**2A**	**2B**	**3B**	**3D**	**4**
Physical						
pH (range)	6.5–9.0	6.5–9.0	6.5–9.0	6.5–9.0	6.5–9.0	6.5–9.0
Turbidity Increase (NTU)	--	10	10	10	15	--
Temperature (ºC)	--	--	--	27	--	--
Max Temperature Change (ºC)	--	--	--	4	--	--
Dissolved Oxygen 2	--	--	--	--	--	--
30-day average	--	--	--	--	--	--
7-day average	--	--	--	--	--	--
1-day minimum	--	--	--	--	--	--
Total dissolved gases	--	--	--	--	--	--
Metals (dissolved, maximum mg/L)3						
Arsenic	0.01	--	--	--	--	0.1
Barium	1	--	--	--	--	--
Beryllium	<0.004	--	--	--	--	--
Cadmium	0.01	--	--	--	--	0.01
Chromium	0.05	--	--	--	--	0.1
Copper	--		--	--	--	0.2
Lead	0.015	--	--	--	--	0.1
Mercury	0.002	--	--	--	--	--
Selenium	0.05	--	--	--	--	0.5
Silver	0.05	--	--	--	--	--

Domestic Water Uses		Recreation Uses		Aquatic Wildlife Uses	Agricultural Uses	
Metals (dissolved, maximum µg/L)3,4						
Aluminum5	--	--	--	87/750	87/750	--
Arsenic (trivalent)	--	--	--	150/340	150/340	--
Cadmium	--	--	--	0.25/2	0.25/2	--
Chromium (hexavalent)	--	--	--	11/16	11/16	--

3.6.2.4.2 Impairments

Pursuant to Section 303(d) of the CWA as amended, the State of Utah is required to identify the assessment units (AUs) for which existing pollution controls are not stringent enough to implement state water quality standards. An AU is considered water quality limited when it is known that its water quality does not meet applicable water quality standards or is not expected to meet to applicable water quality standards. Impaired streams in the MBPA were identified by the UDEQ and are shown in **Table 3.6.2.3.2-1** (UDEQ 2010). **Figure 3.6.2.3-1** depicts the impaired streams.

The State of Utah has determined that all segments of the Green River in the Uinta Basin are supporting designated beneficial uses. Pariette Draw was assessed as impaired for agricultural activities (use designation 4) due to boron and total dissolved solids (TDS). Pariette Draw was also assessed as impaired for warm water species of game fish and other warm water aquatic life (use designation 3B) due to selenium (UDEQ-DWQ 2010). Due to these exceedances, Pariette Draw is listed on Utah's 2010 303(d) list of impaired waters and is described in greater detail in the following paragraphs. **Table 3.6.2.3.2-1** summarizes the water quality data available for Pariette Draw. Section 303(d) of the CWA and EPA's Water Quality Planning and Management Regulations (40 CFR 130) require states to develop total maximum daily loads (TMDLs) of pollutants for water bodies that are not meeting applicable water quality standards. TMDLs list the maximum amount of a pollutant that a water body can assimilate and still meet water quality standards.

TABLE 3.6.2.3.2-1
SUMMARY OF TMDL LOAD REDUCTIONS IN PARIETTE DRAW (STORET SITE 4933480) REQUIRED FOR SURFACE WATERS DOWNSTREAM OF THE PROPOSED PROJECT

Pollutant of Concern	TDS	Boron	Selenium
Current load	174.77b tons/day	137.98b tons/day	0.23b lbs/day
Loading capacity	59.85b tons/day	64.68b tons/day	0.17b lbs/day
TMDL load reduction	114.91b tons/day	73.30b tons/day	0.07b lbs/day
Percentage reduction	65.8%	53.1%	28.1%

Source Note: 2010. UDEQ-DWQ. TMDLs for Total Dissolved Solids, Selenium, and Boron in Pariette Draw.
[a] Load over the 10%–40% flow percentile range.

TABLE 3.6.2.3.2-2
IMPAIRED STREAMS

Assessment Unit ID	Assessment Unit Name	Cause	Use	Source
UT14060005-002_00	Pariette Draw Creek	Boron, Selenium, and TDS	Agricultural, Warm Water Aquatic Life, and Wildlife Habitat	Agriculture, Habitat Modification (other than hydromodification), Natural Sources, Irrigated Crop Production, and Livesock

As water flows over and through soil particles and rock, soluble materials accumulate in the water. Major ions commonly found in water are sodium, calcium, magnesium, potassium, chloride, sulfate, and bicarbonate. In addition to ions, there are other dissolved substances in water such as dissolved organic materials. The sum of all of the dissolved substances in water is TDS and is measured in milligrams per liter (mg/L). Selenium is both an essential micronutrient and a potentially detrimental element in high concentrations. Selenium has been shown to cause mortality, deformity, and reproductive failure in fish and aquatic birds (EPA 1998a). Boron is a naturally occurring trace element that is essential for the growth of crop plants as well as some algae, fungi, and bacteria, but can be toxic in excess amounts.

According to Pariette Draw's TMDL, TDS, boron, and selenium in the area are derived primarily from natural sources. In addition to natural pathways, irrigation management has resulted in artificial transport pathways of these constituents to surface waters. The USGS, Bureau of Reclamation, and BLM developed a modeling tool called SPARROW (Spatially-Referenced Regression On Watershed attributes), which was used to interpret water quality data for dissolved solids specific to surface waters in the Upper Colorado River Basin (UCRB) (Kenney et al. 2009). The MBPA is within the UCRB. The SPARROW model relates measured chemical constituents at monitoring stations to upland catchment attributes, such as land use, land cover, or geology. The model is a statistical assessment based on an existing transport model and available water-quality monitoring data for the UCRB. Of the 22 factors that were considered in the model, the largest factors influencing TDS concentrations in surface waters in the UCRB are:

- **Bedrock geology.** Bedrock geology, particularly sedimentary rock formed from marine sediments, is the largest natural source of dissolved solids to streams in the UCRB (Iorns et al. 1965; Liebermann et al. 1989; U.S. Department of the Interior 2003; Anning et al. 2007; Kenney et al. 2009). Due to its chemical composition, exposure, and erodibility, the Uinta Formation is a natural source of soluble salts. The Uinta Formation is a continental formation and was formed in lacustrine to fluvial environments. Some of the lake sediments in the formation are highly saline as the area was a terminal lake without an outlet.
- **Climate characteristics.** Precipitation is the major land-to-water transport mechanism associated with natural sources of dissolved solids. Evaporative transpiration is another mechanism that can enhance the transport of dissolved solids to streams. Evaporative transpiration is the process of transferring water to the atmosphere through evaporation of water and transpiration from plants. Vegetation consumes water containing dissolved solids from within the soil zone and transpires pure water, leaving behind the dissolved minerals. Evaporation on bare soils also removes pure water and precipitates minerals on the soil surface, which are immediately available for dissolution through precipitation and surface runoff.

- **Irrigated agriculture.** Irrigation water and natural precipitation (in excess of soil holding capacity and plant requirements) percolates through the soils and transports these constituents into the shallow alluvial aquifer (groundwater) where they eventually return to the streams as base flow. Deposition of salts on the ground surface also seals the soil pores that prevent percolation and increase the volume and velocity of runoff, which leads to sheet flows and increased pollutant loading. Irrigation of agricultural lands, particularly those derived from sedimentary rocks, is the major anthropogenic source of dissolved solids in the UCRB, which accounts for approximately 40 percent of the dissolved solids load (Iorns et al. 1965, Liebermann et al. 1989, Kenney et al. 2009). Irrigation return flows are a potential source of salinity, because they dissolve and transport soil particles and salts from fields and return them to surface waters through surface and subsurface flows.

The primary natural source of boron in the area is bedrock that was formed from evaporated swamps and marshes. The Uinta Basin was once covered by Uinta Lake, which eventually evaporated to marshlands before finally disappearing. Shallow groundwater transport is an important transport pathway of boron in the area (Naftz et al. 2008). Boron concentrations in groundwater are derived from leaching of rocks and soils that contain borate and borosilicate minerals. The highest boron concentrations in Pariette Draw occur from November through March, which suggests two conclusions: 1) groundwater contributions are responsible for most of the boron impairment; and 2) stormwater runoff generally dilutes the concentrations in surface waters.

As noted in Utah's 2010 303(d) list, the primary sources of selenium in Pariette Draw are natural sources and irrigated crops. Transport of eroded soil from the Pariette Draw drainage area (some of which has naturally high concentrations of selenium) is also an important pollutant source. The primary natural source of selenium in the area is found in black shale-derived soils and landscapes. Black shale comprises organic-rich, fine-grained sedimentary rock deposited in very low oxygen conditions. Dry conditions make irrigation necessary for nearly all crops grown in the drainage area. Normal aqueous chemical processes that have been enhanced by seepage from irrigated agriculture are capable of transporting some of the naturally occurring selenium in the sediments to the stream system. Seeps in the area provide another pathway for selenium to move from groundwater to surface water.

Two USGS studies on TDS do not identify surface erosion as an important transport pathway of TDS to surface waters in the UCRB (Kenney et al. 2009). These studies also report that surface disturbance, including disturbance related to oil and gas development, does not have a statistically significant impact to TDS concentrations in surface waters in the area. Likewise, neither surface disturbance nor oil and gas development was noted in the Pariette Draw TMDL as important factors in selenium or boron transport or surface water concentrations. The possible exception to this would be disturbance on heavily irrigated lands that have higher than normal soil concentrations of selenium or boron. The Pariette Draw TMDL states "though oil and gas well pads are prevalent in the watershed, they are not considered a major source based on observations of BMPs employed during site visits in the field (UDEQ-DWQ 2010)."

Sediment loading, salinity, and the trace element selenium are the most substantial water quality concerns in the MBPA. Current sediment loading/year to the Green River is approximately 9,684,000 tons at Jensen, Utah (BLM 2005b). No data are available on sediment loading to other perennial and intermittent waterways in or near the MBPA.

Between July 2, 2009, and August 8, 2012, the USGS collected 11 water samples from a stream gauge on the Green River at Ouray, Utah (Stream Gauge 09272400) (USGS 2012a). The TDS concentration varied from 171 mg/L to 413 mg/L, with an average concentration of 341 mg/L. The average flow in the Green

River at the same gauge varied from 3,814 cfs in 2010 to 7,172 cfs in 2011, with an average flow of 5,493 cfs. Salt load is a function of flow and concentration. Therefore, an estimate for the average TDS load in the Green River at the confluence of Pariette Draw was derived by multiplying the average TDS concentration by the average flow of 5,041 tons/day of TDS. As previously mentioned, the average TDS load from Pariette Draw is about 175 tons/day, so Pariette Draw increases the TDS load in the Green River by approximately 3 percent.

The selenium concentration in the Green River at Stream Gauge 09272400 varied from 0.39 micrograms per liter (µg/L) to 0.88 µg/L with an average concentration of 0.71 µg/L. Assuming an average flow in the Green River of 5,493 cfs, the average selenium load in the Green River near the MBPA would be 21.0 lbs/day. As previously mentioned, the average selenium load from Pariette Draw is about 0.23 lbs/day; therefore, Pariette Draw increases the selenium load in the Green River by about 1 percent.

3.6.3 Groundwater Resources

Groundwater occurs and is conveyed in underground aquifers that may consist of unconsolidated or consolidated materials. Unconsolidated alluvial aquifers are usually unconfined and generally found in the shallowest or most recent geologic formations. Consolidated aquifers, which tend to be found in older geologic formations, are generally unconfined near outcrops and confined at greater depth beneath the ground surface. Multiple aquifers may underlie any given location on the land surface. These aquifers not only may have distinct characteristics of geochemistry and hydraulic potential, but also may be recharged in different locations and flow in different directions.

3.6.3.1 Occurrence of Groundwater Resources

An estimated 31 million acre-feet of groundwater (computed without regard for water quality) is stored in the upper 100 feet of saturated material in aquifers of the Uinta Basin (UDWaR 1999). The majority of this groundwater is in consolidated or bedrock aquifers. The principal aquifers associated with the MBPA are (from shallowest to deepest) the Uinta-Animas aquifer, the Mesaverde aquifer, and the Dakota-Glen Canyon aquifer system. Unconsolidated aquifers are less widespread in the Uinta Basin. They occur mostly in the Duchesne-Myton-Pleasant Valley area, which lies outside the MBPA (UDWaR 1999). Within the MBPA, the formations comprising the Uinta-Animas aquifer extend from the ground surface to approximately 5,000 to 7,000 feet bgs. Water bearing units in the Uinta-Animas aquifer commonly are separated from each other and from the underlying Mesaverde aquifer by units of low permeability claystone, shale, marlstone, or limestone. The formations comprising the Mesaverde aquifer extend to a depth of approximately 10,000 to 15,000 feet bgs. They are underlain by the Mancos shale, which acts as a confining unit for lower aquifers and a potential barrier to vertical groundwater flow and movement (USGS 1995). The Dakota-Glen Canyon aquifer is found at depths greater than 15,000 feet bgs in the MBPA. The UGS,in a recent publication, showed numerous Underground sources of Drinking Water (USDWs) at depth (Anderson et al. 2012).

3.6.3.2 Recharge/Discharge of Aquifers

According to the UDWaR (1999), recharge to the consolidated bedrock aquifers occurs in a variety of ways, including:

- Infiltration of precipitation directly into the fractured bedrock outcrops or into the aquifer from overlying, saturated, unconsolidated deposits.
- Upward leakage of groundwater from underlying formations.

- Downward leakage of groundwater from overlying formations.
- Seepage into the aquifers from streams flowing across outcrops, where the water table is lower than the streambed.
- Inflow of groundwater that originates outside the basin but flows into the basin.

Basin-wide, the total annual estimated recharge to consolidated bedrock aquifers is 630,000 acre-feet, divided between infiltration of precipitation (600,000 acre-feet/year), infiltration of irrigation water (20,000 acre-feet/year), and return flow from wells and springs (10,000 acre-feet/year). Subsurface inflow in the Uinta Basin is estimated to be negligible. It has been observed that approximately 80 percent of the total aquifer recharge occurs in the northern half of the Uinta Basin. This occurs because greater amounts of water, particularly in the form of precipitation, are available to enhance aquifer recharge in the Uinta Mountains, as compared to the water available in the much lower and more arid upland areas at the southern edge of the basin.

According to the Utah Division of Water Rights (UDWaR) (1999), discharge of groundwater from the consolidated bedrock aquifers occurs during the following scenarios:

- Springs and seeps, including seepage into streambeds.
- Water wells.
- Evaporative transpiration.
- Upward leakage into the overlying formations.
- Downward leakage into underlying formations.
- Small subsurface flows into neighboring basins.

The total annual estimated discharge of 630,000 acre-feet is divided among evapotranspiration in vegetated areas (246,000 acre-feet/year), seepage to streams and discharge to springs (combined 363,000 acre-feet/year), and withdrawal from wells and springs (21,000 acre-feet/year). The location of the four springs is shown on **Figure 3.6.3.2-1 (Attachment 1)**. Subsurface outflow in the Uinta Basin is estimated to be negligible.

3.6.3.3 Groundwater Quality

In the Uinta Basin, dissolved-solids concentrations in water in the Uinta-Animas aquifer generally range from 500 to 3,000 mg/L; however, concentrations can exceed 10,000 mg/L in some of the deeper parts of the Uinta Formation. Water that is defined as “usable” has less than or equal to 10,000 mg/L TDS. Federal Safe Drinking Water Act regulations define a USDW as an aquifer or portion thereof: (a)(1) which supplies any public water system; or (2) which contains a sufficient quantity of ground water to supply a public water system; and (i) currently supplies drinking water for human consumption; or (ii) contains fewer than 10,000 mg/L total dissolved solids; and (b) which is not an exempted aquifer (See 40 CFR Section 144.3). Smaller dissolved-solids concentrations are prevalent near recharge areas where the water usually is a calcium or magnesium bicarbonate type. Larger dissolved-solids concentrations are more common near discharge areas where the water generally is a sodium bicarbonate or sulfate type (USGS 1995).

Groundwater quality in the Mesaverde aquifer is highly variable. In many of the basin margin areas, the dissolved solids concentrations in water are fewer than 1,000 mg/L; however, local concentrations can exceed 35,000 mg/L. Relatively fresh water tends to occur in areas of the aquifer that are recharged by infiltration from precipitation or surface water sources (USGS 1995).

In the Glen Canyon aquifer, dissolved solids concentrations in water tend to be less than 1,000 mg/L, where the aquifer is less than 2,000 feet bgs. However, where the aquifer is deeply buried, the concentration of dissolved solids can exceed 35,000 mg/L (USGS 1995).

Vander Berg et al (2013) show that the Birds Nest Aquifer, located beneath the northeastern portion of the MBPA, has very high saline concentrations. This aquifer has an average thickness of about 84 feet and is at a depth between 1,500 and 2,000 feet bgs. Some areas exceed 10,000 mg/L and may be used as a disposal area for saline water. Recent studies have identified that the saline zone for the Birds Nest Aquifer within the MBPA ranges from 57 to 1,509 feet bgs, while areas nearest the MBPA have a saline zone within the Birds Nest Aquifer that is 1,400 to 1,500 feet bgs (Vanden Berg et al. 2013). Existing studies suggest that groundwater within the MBPA starts to become saline at relatively shallow depths of less than 500 feet bgs (Holmes et al. 1987). The potential for smaller fresh water lenses within these formations exists, but in general, these lenses would be considered too deep for domestic or stock use. The potential for the presence of usable non-saline groundwater occurs primarily within the Uinta-Animas aquifer formations.

There are numerous small surface water diversions and point-to-point diversions (stream segment from which stock may drink) within the MBPA, mainly for stock watering. The UDWaR identifies only five water supply wells within the proposed MBPA, which are shown in **Table 3.6.3.3-1**. These wells are also depicted on **Figure 3.6.3.2-1 (Attachment 1)**.

TABLE 3.6.3.3-1
KNOWN GROUNDWATER USERS IN THE MBPA

Water Right Number and Type	Name of Water Right Holder	Cadastral Location	Water Uses	Depth (feet)	Water Quality Data Available?
Well (47-1820)	Gasco Production Company	T9S, R18E, Section 29	Domestic, oil production	200–300	Yes
Well (47-1805)	Inland Production Company	T8S, R17E, Section 21	Unknown	4,990	No
Well (47-1346)	Louis Clark Roberts	T8S, R17E, Section 21	Unknown	Unknown	No
Well (47-1501)	Clark and Arva Abegglen	T8S, R17E, Section 21	Irrigation, Stock, Domestic	Unknown	No
Well (47-1330)	USA Bureau of Land Management	T9S, R17E, Section 4	Unknown	Unknown	No

Table 3.6.3.3-2 summarizes groundwater quality data that was obtained for the only known well. The limited water quality data available in the MBPA show saline groundwater at depths of 200 to 300 feet bgs. The Gasco production well, which draws water from a depth of 200 to 300 feet bgs, has a TDS value of 4,187 mg/L, which is considered brine.

TABLE 3.6.3.3-2
AVAILABLE WATER QUALITY DATA FOR THE MBPA

Constituent	Units	Gasco Production Well (47-1820) (4/29/2011)	Meet or Exceed Primary or Secondary Drinking Water Standard?
Total dissolved solids	mg/L	4,187	Exceeds
pH	pH Units	8.1	Meets
Conductivity	uS/cm	6,344	N/A
Temperature	F	80	N/A
Calcium	mg/L	4.3	N/A
Magnesium	mg/L	1.5	N/A
Barium	mg/L	0.13	N/A
Sodium	mg/L	1,393	N/A
Iron	mg/L	0.15	Meets
Manganese	mg/L	0.03	Meets
Bicarbonate	mg/L	976	N/A
Sulfate	mg/L	807	Exceeds
Chloride	mg/L	1,000	Exceeds
Hydrogen Sulfide (gas)	mg/L	5.0	N/A

3.7 VEGETATION

3.7.1 General Vegetation

The MBPA is located within the Intermountain Semi-desert region of the Colorado Plateau floristic province. This region has an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors to produce a mosaic of floristic components and associated natural habitats. The plant communities encountered in the MBPA consist of typical Intermountain Basins Shrubland associations. These communities are often mixed, transitional, or widely distributed.

The vegetation communities within the MBPA are mapped and described using data and descriptions from the Southwest Regional Gap Analysis Project (SWReGAP) vegetation maps (Lowry et al. 2007), according to methodologies and nomenclature adopted by the U.S. National Vegetation Classification System (FGDC 1997). Data on wetlands were supplemented with interpretation of aerial photographs (USGS 2011) and information from U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps (USFWS 2012a). A total of 17 vegetation communities are recognized and mapped within the MBPA, as depicted in **Figure 3.7.1-1 (Attachment 1)**. These 17 vegetation types were grouped into five general land cover types: Scrub/Shrub, Grassland/Herbaceous, Wetlands, Barren Lands, and Altered/Disturbed Lands. **Table 3.7.1-1** summarizes acreage of vegetation communities within the MBPA by land cover type.

TABLE 3.7.1-1
VEGETATION COMMUNITIES WITHIN THE MBPA

Land Cover Type	Vegetation Community	Acres within the MBPA[1]	Percent of the MBPA
Scrub/Shrub	Colorado Plateau Pinyon-Juniper Woodland and Shrubland	6,191	5.2
	Colorado Plateau Mixed Low Sagebrush Shrubland	24,003	20.2
	Intermountain Basins Big Sagebrush Shrubland	6,998	5.9
	Intermountain Basins Mat Saltbush Shrubland	662	0.6
	Intermountain Basins Mixed Salt Desert Scrub	43,236	36.4
Total		**81,090**	**68.2**
Grassland/ Herbaceous	Intermountain Basins Semi-Desert Grassland	3,024	2.5
	Intermountain Basins Semi-Desert Shrub Steppe	8,547	7.2
Total		**11,571**	**9.7**
Wetlands	Intermountain Basins Greasewood Flat	7,233	6.1
	Rocky Mountain Lower Montane Riparian Woodland and Shrubland	339	0.3
	Open Water	209	0.2
Total		**7,781**	**6.5**
Barren Lands	Intermountain Basins Shale Badland	1,501	1.3
	Colorado Plateau Mixed Bedrock Canyon and Tableland	4,832	4.1
Total		**6,333**	**5.3**
Altered/ Disturbed Lands	Invasive Annual Grassland	4,006	3.4
	Invasive Southwest Riparian Woodland and Shrubland	191	0.2
	Agricultural Lands	2,005	1.7
	Existing Development (i.e., roads, well pads, or other surface facilities)	5,959	5.0
Total		**12,161**	**10.2**
Grand Total		**118,936**	**100.0**

[1]Total acreage estimates are based on GIS-software calculations and may not equal total acreage by soil map unit due to rounding, removal of overlapping development, and minute boundary discrepancies. GIS-based calculations are considered more accurate than estimates calculated using simple addition, and therefore will be used throughout this document.

3.7.1.1 Scrub/Shrub

The Scrub/Shrub land cover type covers approximately 81,090 acres within the MBPA. Five vegetation communities are represented in this group: Colorado Plateau Pinyon-Juniper Woodland and Shrubland; Colorado Plateau Mixed Low Sagebrush Shrubland; Intermountain Basins Big Sagebrush Shrubland; Intermountain Basins Mat Saltbrush Shrubland; and Intermountain Basins Mixed Salt Desert Scrub. The five scrub/shrub vegetation types that occur in the MBPA are described briefly below.

3.7.1.1.1 Colorado Plateau Pinyon-Juniper Woodland and Shrubland

This vegetation cover type occurs in dry mountains and foothills of the Colorado Plateau region from the Western Slope of Colorado to the Wasatch Range. It is typically found at lower elevations ranging from 5,000 to 8,000 feet amsl. The vegetation is dominated by dwarfed (usually less than 10 feet tall) two-needle pinyon (*Pinus edulis*) and/or Utah juniper (*Juniperus osteosperma*) trees that form extensive tall shrublands. These trees occur in a mosaic with taller (usually greater than 10 feet tall), more dense woodland associations of two-needle pinyon and/or Utah juniper. These stands may be solely dominated by Utah juniper (*Juniperus osteosperma*) or may be co-dominated by other *Juniperus* species. Other shrubs that may occur in this vegetation community may include black sagebrush (*Artemisia nova*), Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), or yellow rabbitbrush (*Chrysothamnus viscidiflorus*). This vegetation cover type covers approximately 6,191 acres within the MBPA.

3.7.1.1.2 Colorado Plateau Mixed Low Sagebrush Shrubland

Located in the Colorado Plateau, Tavaputs Plateau, and Uinta Basin, this vegetation cover type occurs in canyons, gravelly draws, hilltops, and dry flats at elevations generally below 6,000 feet amsl. Soils are often rocky, shallow, and alkaline. It includes open shrublands and steppe dominated by black sagebrush, Bigelow sagebrush (*Artemisia bigeloviin*), or sometimes Wyoming big sagebrush. The Colorado Plateau Mixed Low Sagebrush Shrubland type covers approximately 24,003 acres within the MBPA.

3.7.1.1.3 Intermountain Basins Big Sagebrush Shrubland

Found in broad basins between mountain ranges, plains, and foothills, this vegetation cover type occurs throughout much of the western U.S., at elevations between 5,000 and 7,500 feet amsl. Soils are typically deep, well drained, and non-saline. These shrublands are dominated by Basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and/or Wyoming big sagebrush. Scattered juniper (*Juniperus* spp.), greasewood (*Sarcobatus vermiculatus*) and saltbush (*Atriplex* spp.) may be present in some stands.

Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush, antelope bitterbrush (*Purshia tridentata*), or mountain snowberry (*Symphoricarpos oreophilus*) may co-dominate altered/disturbed stands. The Intermountain Basins Big Sagebrush Shrubland type covers about 6,998 acres within the MBPA.

3.7.1.1.4 Intermountain Basins Mat Saltbush Shrubland

This vegetation cover type occurs on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin. Substrates are shallow, typically saline, alkaline, fine-textured soils. These landscapes that typically support dwarf shrublands are composed of relatively pure stands of saltbush such as mat saltbush (*Atriplex corrugate*) or Gardner's saltbush (*Atriplex gardneri*). Other dominant or co-dominant dwarf-shrubs may include longleaf wormwood (*Artemisia longifolia*), birdfoot sagebrush (*Artemisia pedatifida*), or bud sagebrush (*Picrothamnus desertorum*), sometimes mixed with other low shrubs like winterfat (*Krascheninnikovia lanata*), or shortspine horsebrush (*Tetradymia spinosa*). The Intermountain Basins Mat Saltbush Shrubland type covers approximately 662 acres within the MBPA.

3.7.1.1.5 Intermountain Basins Mixed Salt Desert Scrub

This widespread shrub-steppe system is dominated by perennial grasses and forbs, and it occurs throughout much of the northern Great Basin and Wyoming. Soils are typically deep and nonsaline, often with a microphytic crust. Shrubs may increase following heavy grazing and/or fire suppression activities. The

vegetation is characterized by a typically open to moderately dense shrubland that are comprised of one or more saltbush species such as shadscale saltbush (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), or cattle saltbush (*Atriplex polycarpa*). Other shrubs that may be present to co-dominant include Wyoming big sagebrush, yellow rabbitbrush, rubber rabbitbrush, Mormon tea (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), winterfat, bud sagebrush, or shortspine horsebrush. These shrublands and steppe habitats are the most prevalent vegetation community in the MBPA, covering approximately 43,236 acres.

3.7.1.2 Grassland/Herbaceous

The Grassland/Herbaceous land cover type covers approximately 11,571 acres within the MBPA and includes two vegetation cover types: Intermountain Basins Semi-Desert Grassland and Intermountain Basins Semi-Desert Shrub Steppe. These vegetation types are described below.

3.7.1.2.1 Intermountain Basins Semi-Desert Grassland

This vegetation cover type occurs throughout the intermountain western U.S. on dry plains and mesas at elevations between 4,750 and 7,600 feet amsl. These grasslands occur in lowland and upland areas and may occupy swales, playas, mesa tops, plateau parks, alluvial flats, and plains, but sites are typically xeric. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant. Grasslands are typically dominated or co-dominated by Indian ricegrass (*Achnatherum hymenoides*), threeawn (*Aristida*) spp., blue grama (*Bouteloua gracilis*), needle-and-thread grass (*Hesperostipa comate*), Torrey's muhly (*Muhlenbergia torreyana*), or James' galleta (*Pleuraphis jamesii*). In addition, this vegetation type may include scattered shrubs and dwarf-shrubs of species of sagebrush, saltbush, and snakeweed. The Intermountain Basins Semi-Desert Grassland type covers approximately 3,024 acres within the MBPA.

3.7.1.2.2 Intermountain Basins Semi-Desert Shrub Steppe

This vegetation cover type includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the intermountain western U.S. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but they can include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more saltbush species, with a sparse to moderately dense herbaceous layer dominated by perennial grasses.

Characteristic grasses include Indian ricegrass, blue grama, saltgrass (*Distichlis spicata*), needle-and-thread grass, James' galleta, Sandberg bluegrass (*Poa secunda*), and alkali sacaton (*Sporobolus airoides*).

Characteristic shrub species include fourwing saltbush, sand sagebrush (*Artemisia filifolia*), Greene's rabbitbrush (*Chrysothamnus greenei*), yellow rabbitbrush, rubber rabbitbrush, broom snakeweed (*Gutierrezia sarothrae*), and winterfat. Scattered Basin big sagebrush species may be present but does not dominate. The Intermountain Basins Semi-Desert Shrub Steppe type covers approximately 8,547 acres of the MBPA.

3.7.1.3 Wetlands

The wetlands land cover type covers approximately 7,781 acres within the MBPA and includes three (3) vegetation cover types: Intermountain Basins Greasewood Flat, Rocky Mountain Lower Montane Riparian Woodland and Shrubland, and Open Water.

3.7.1.3.1 Intermountain Basins Greasewood Flat

This vegetation cover type occurs throughout much of the western U.S. in intermountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table. They may flood intermittently but remain dry for most growing seasons. This vegetation cover type usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or co-dominated by greasewood, fourwing saltbush, or shadscale saltbush. Occurrences are often surrounded by mixed salt desert scrub. This woody vegetation community is the most prevalent wetland habitat, covering about 7,233 acres within the MBPA.

3.7.1.3.2 Rocky Mountain Lower Montane Riparian Woodland and Shrubland

This vegetation cover type is found in the foothills, canyon slopes, and lower mountains of the Rocky Mountains and on outcrops and canyon slopes in the western Great Plains. These shrublands occur at elevations between 5,000 and 9,500 feet amsl and are usually associated with exposed sites, rocky substrates, and dry conditions, all of which limit tree growth. Dominant trees may include boxelder (*Acer negundo*), narrowleaf cottonwood (*Populus angustifolia*), balsam poplar (*Populus balsamifera*), eastern cottonwood (*Populus deltoids*), Fremont cottonwood (*Populus fremontii*), Douglas-fir (*Pseudotsuga menziesii*), peachleaf willow (*Salix amygdaloides*), or Rocky Mountain juniper (*Juniperus scopulorum*).

Dominant shrubs include Rocky Mountain maple (*Acer glabrum*), speckled alder (*Alnus incana*), water birch (*Betula occidentalis*), red osier dogwood (*Cornus sericea*), river hawthorn (*Crataegus rivularis*), stretchberry (*Forestiera pubescens*), chokecherry (*Prunus virginiana*), skunkbush sumac (*Rhus trilobata*), park willow (*Salix monticola*), Drummond's willow (*Salix drummondiana*), narrowleaf willow (*Salix exigua*), sandbar willow (*Salix irrorata*), shining willow (*Salix lucida*), or silver buffaloberry (*Shepherdia argentea*). The Rocky Mountain Lower Montane Riparian Woodland and Shrubland type covers approximately 339 acres within the MBPA.

3.7.1.3.3 Open Water

This category includes all stock ponds, lakes, reservoirs, streams, rivers, or other ponded waters that are situated in topographic depressions or defined channels and covers 209 acres. These habitats are characterized by persistent emergent vegetation that is sparse or lacking, but include any areas with abundant submerged or floating-leaved aquatic vegetation. Common submerged and floating vegetation includes various species of duckweed (*Lemna* sp.), pondweed, watershield (*Brasenia* sp.), watermilfoil (*Myriophyllum* sp.), hornwort (*Ceratophyllum* sp.), and waterweed (*Elodea sp.*).

3.7.1.4 Barren Lands

The Barren Lands group covers approximately 6,333 acres within the MBPA and includes two vegetation cover types: Intermountain Basins Shale Badland and Colorado Plateau Mixed Bedrock Canyon and Tableland. These two vegetation communities are described below.

3.7.1.4.1 Intermountain Basins Shale Badland

This widespread vegetation cover type of the intermountain western U.S. is composed of barren and sparsely vegetated substrates typically derived from marine shales; however, this vegetation community also includes substrates that are derived from siltstones and mudstones (clay) with a high rate of erosion

and deposition. Landforms are typically rounded hills and plains that form a rolling topography. Environmental variables that lead to sparse dwarf-shrubs are harsh soil properties and the high rate of erosion and deposition. Species in this category include mat saltbush, Gardner's saltbush, birdfoot sagebrush, and herbaceous vegetation. The Intermountain Basins Shale Badland type covers approximately 1,501 acres within the MBPA.

3.7.1.4.2 Colorado Plateau Mixed Bedrock Canyon and Tableland

The distribution of this vegetation cover type is centered on the Colorado Plateau where it is composed of barren and sparsely vegetated landscapes on steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. The vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. Common varieties include two-needle pinyon, Ponderosa pine (*Pinus ponderosa*), Juniper species, littleleaf mountain mahogany (*Cercocarpus intricatus*), and other short-shrub and herbaceous species. These species have adapted to using moisture from cracks and pockets where soil accumulates as habitat. The Colorado Plateau Mixed Bedrock Canyon and Tableland type covers approximately 4,832 acres within the MBPA.

3.7.1.5 Altered/Disturbed Lands

The Altered/Disturbed Lands group covers approximately 12,161 acres within the MBPA and includes four vegetation cover types: Invasive Annual Grassland, Invasive Southwest Riparian Woodland and Shrubland, Agricultural Lands, and Existing Development. While not a vegetation cover type *per se*, the Existing Development category includes all scraped or excavated bare land that is or has been in transition to a developed state. The four categories of altered or disturbed vegetation communities that occur within the MBPA are described below.

3.7.1.5.1 Invasive Annual Grassland and Invasive Southwest Riparian Woodland and Shrubland

The Invasive Annual Grassland vegetation type covers approximately 4,006 acres within the MBPA. It is dominated by annual grass species such as cheatgrass (*Bromus tectorum*) and California brome (*Bromus carinatus*) that have been introduced to the area. The Invasive Southwest Riparian Woodland and Shrubland type covers approximately 191 acres and is dominated by tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*).

3.7.1.5.2 Agricultural Lands

The Agricultural Lands category includes areas used for planting grasses, legumes, or grass-legume mixtures for livestock grazing; producing hay or annual crops such as corn, soybeans, vegetables; or growing perennial woody crops such as orchards and vineyards. The NRCS Utah State Office has designated certain soil map units in Duchesne and Uintah Counties as prime farmlands only if irrigated (NRCS Utah State Office 2011, 2013). Based on the NRCS 2013_9 Draft (2013) for Duchesne County and NRCS Table Y (2011) for Uintah County, soil map units (27) Boreham loam, (160) Nakoy loamy fine sand, and (206) Shotnick sandy loam are listed as prime farmland and present within the MBPA. For more details about these soil map units within the MBPA, see **Figure 3.5-1** (**Attachment 1**) and **Table 3.5-1**. The agricultural vegetation community covers about 2,005 acres within the MBPA.

3.7.1.5.3 Existing Development

The Existing Development category consists of all scraped or excavated bare land that is currently in or has previously been in transition to a developed state. This includes all lands covered by urban development, including residential, transportation, utility infrastructure, well pads, mines, quarries, and other surface features. Isolated structures such as farmsteads and low density residential areas are also included in this category. As part of the Altered/Disturbed Lands group, Existing Development covers an estimated 5,959 acres within the MBPA.

3.7.2 Invasive and Noxious Weeds

A "noxious weed" is defined as any plant the Utah Commissioner of Agriculture and Food determines to be especially injurious to public health, crops, livestock, land, or other property per the Utah Noxious Weed Act (Utah State Legislature 2007). Invasive weeds include plants that are not listed as noxious but are non-native to a particular area.

State- and County-listed noxious weeds are organized into three levels: A, B, and C. Class A weeds have a relatively low population size within the state and are given highest priority as an *Early Detection Rapid Response* weed. Class B weeds have a moderate population throughout the state and are generally thought to be controllable in most areas. Class C weeds are found extensively in the state and are thought to be beyond control. Therefore, efforts would be made towards containment of smaller infestations. **Table 3.7.2-1** summarizes those weeds designated and published as noxious for the State of Utah, per the Commissioner of Agriculture and Food, Section 4-17-3, Utah Noxious Weed Act.

The most common locations for weeds include existing disturbance areas such as roadsides, well pads, pipelines, adjacent washes, and areas where grazing has removed native species. The most problematic noxious weeds in the MBPA and surrounding region are saltcedar (*Tamarix ramosissima)*, Russian knapweed (*Centaurea virgate*), and hoary cress (*Cardaria draba)*. Although not listed on the noxious weed list, the most common invasive species in the MBPA are Russian thistle (*Salsola iberica*), halogeton (*Halogeton glomeratus*), and cheatgrass.

TABLE 3.7.2-1
UINTAH COUNTY, DUCHESNE COUNTY, AND STATE OF UTAH NOXIOUS WEEDS

Common Name	Scientific Name	State or County Noxious Weed List
Black Henbane	*Hyoscyamus niger*	State List Class A
Diffuse Knapweed	*Centaurea diffusa*	State List Class A
Johnson grass	*Sorghum halepense*	State List Class A
Leafy Spurge	*Euphorbia esula*	State List Class A
Medusahead	*Taeniatherum caput-medusae*	State List Class A
Oxeye Daisy	*Chrysanthemum leucanthemem*	State List Class A
Purple Loosestrife	*Lythrum salicaria*	State List Class A
Spotted Knapweed	*Centaurea maculosa*	State List Class A
St. Johnswort	*Hypericum perforatum*	State List Class A
Sulfur Cinquefoil	*Potentilla recta*	State List Class A

Common Name	Scientific Name	State or County Noxious Weed List
Yellow Star thistle	*Centaurea solstitialis*	State List Class A
Yellow Toadflax	*Linaria vulgaris*	State List Class A
Bermudagrass	*Cynodon dactylon*	State List Class B
Dalmation Toadflax	*Linaria genistifolia*	State List Class B
Dyer's Woad	*Istatis tinctoria*	State List Class B
Hoary Cress	*Cardaria draba*	State List Class B
Perennial Pepperweed	*Lepidium latifolium*	State List Class B
Poison Hemlock	*Conium maculatum*	State List Class B
Russian Knapweed	*Centaurea repens*	State List Class B
Scotch Thistle	*Onopordum acanthium*	State List Class B
Squarrose Knapweed	*Centaurea virgata*	State List Class B
Canada Thistle	*Cirsium arvense*	State List Class C
Field Bindweed	*Convolvulus arvensis*	State List Class C
Houndstongue	*Cynoglossum officiniale*	State List Class C
Quack grass	*Elytrigia repens*	State List Class C
Saltcedar	*Tamarix ramosissima*	State List Class C
Common Teasel	*Dipsacus fullonum*	Uintah County List A
Puncturevine	*Tribulus terrestris*	Uintah County List B
Russian Olive	*Elaeagnus angustifolia*	Uintah County List C
Musk Thistle	*Carduus nutans*	Duchesne County List
Water Hemlock	*Cicuta douglasii*	Duchesne County List

3.8 RANGE RESOURCES

3.8.1 Regional Overview

The BLM administers livestock grazing as a permitted use on public rangelands. The western ranching industry relies on large tracts of private, federal, and state surface lands to graze livestock on a seasonal basis. Access to forage on federal and state lands increases the total amount of forage available to livestock, which enables greater livestock production for private ranchers (McGinty et al. 2009). Historically, management of western public lands was formulated with regard to its effects on livestock grazing. However, public land management has become more complex, so considerations are being made to examine multiple uses on rangelands in greater detail. While traditional resource management (i.e., wildlife, watershed health, etc.) for the most part has been complimentary, more recent resource uses (i.e., livestock grazing, oil and gas exploration, recreation, etc.) have become largely competitive (McGinty et al. 2009). Livestock grazing on BLM-administered public lands is authorized in Section 3 of the Taylor Grazing Act of 1934; subsequent federal regulations are set forth in 43 CFR 4100.

Livestock grazing is a permitted use on State of Utah lands, which are administered by SITLA. Livestock grazing is authorized under the Utah Enabling Act, Articles X and XX of the Utah constitution and Sections 53C-1-302(10(a)(ii) and 53C-5-102; subsequent state grazing regulations are set forth under the Utah Administrative Code, Rule R850-50.

The BLM VFO administers grazing in the MBPA in accordance with the Vernal Resource Management Plan (BLM 2008b) and the Guidelines for Grazing Management as developed by the Utah BLM in 1997 (BLM 1997b). The Utah Guidelines were instituted for all Utah rangelands to meet the Standards for Rangeland Health (BLM 1997b) based on basic ecological principles that underlie sustainable production of rangeland resources. The four fundamental standards are outlined below:

- Watersheds are in, or are making significant progress toward, properly functioning physical condition. This condition includes their upland, riparian/wetland, and aquatic components. Soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform, and maintain or improve water quality, water quantity, and timing and duration of flow.
- Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment in order to support healthy biotic populations and communities.
- Water quality complies with state water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.
- Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened or endangered species, Federal proposed, Category 1 and 2 Federal candidate, and other special status species.

3.8.2 Grazing Allotments in the MBPA

The MBPA contains portions of six grazing allotments and one stock drive trail. **Figure 3.8.2-1** provides an overview of the grazing allotments that occur in the MBPA. Currently, cattle are permitted to graze on all allotments. Antelope Powers is also permitted to graze sheep. No livestock grazing permit has been issued for the stock drive trail; however, grazing may be authorized on an annual basis to accommodate livestock being trailed onto or off the grazing allotments. Most allotments are used for livestock grazing during the winter and early spring. The Wetlands grazing allotment is grazed almost year round per an established grazing schedule set forth in an allotment management plan. The Wetlands grazing allotment is subdivided into six pastures by approximately 30.5 miles of fence.

The remaining grazing allotments are for the most part unfenced. Short segments (i.e., gap and/or drift fences) exist in areas to help minimize possible livestock trespass situations. Snow provides the majority of the water needed to sustain livestock; however, perennial and ephemeral streams, 38 earthen reservoirs, four guzzlers, and four springs provide the balance of the water needed for livestock. Grazing permittees may also haul water to livestock during dry periods.

The degree to which native rangelands can support animal grazing—its carrying capacity—is based on several factors, including the class of animal grazing, the vegetation communities grazed, the distance to available water, and topography. The carrying capacity of a grazing allotment is defined in terms of Animal Unit Months (AUMs). An AUM is the amount of forage necessary to sustain one cow, five sheep, or five goats for one month. Between the six allotments, there are approximately 119,690 acres allocated for livestock grazing within the boundaries of the MBPA, which translates to about 13,035 livestock AUMs[1]. Surface disturbance from historic and ongoing oil and gas activities within the MBPA has reduced forage

[1] The difference between the MBPA total and the allotment total is 5,455 acres. About 906 acres within the MBPA are attributed to an unnamed grazing allotment and the remaining acres are associated with the stock drive trail. These acreages were not included in **Table 3.8.2-1**.

and land available for livestock grazing on approximately 3,284 acres - affecting approximately 314 AUMs. AUMs have not been reduced for any of the grazing permits applicable to the MBPA, although the livestock grazing operators are currently using less than their permitted use.

BLM classifies grazing allotments into one of three Selective Management Categories: Category M (Maintain), Category I (Improve), and Category C (Custodial). The Maintain designation means that management objectives will ensure that current uses, range conditions, and productivity are maintained. With the Improve designation, current uses, range conditions, and productivity are not at optimal levels and must be addressed. Management objectives will include implementation of actions to improve existing resource conditions and productivity and to enhance overall multiple use opportunities. Custodial management means that present management is satisfactory and is the only logical management objective under existing conditions. **Table 3.8.2-1** summaries the details of each livestock grazing allotment within the MBPA, including the current management categories and existing surface disturbance calculations.

TABLE 3.8.2-1
LIVESTOCK GRAZING ALLOTMENT INFORMATION WITHIN THE MBPA

Allotment Name	Management Category	Livestock Class[1]	Total Allotment Acres[2]	Acres in MBPA[3]	Percent of Allotment in MBPA	Total AUMs	Calculated AUMs in MBPA[4]	Existing Disturbance w/in MBPA[5]	Existing Disturbance Calculated AUMs[6]
Antelope Powers	M	Ca/Sh	44,996	39,371	87.50	4,463	3,905	1,471	146
Castle Peak	M	Ca	51,824	27,197	52.48	4,760	2,498	344	32
Eightmile Flat	M	Ca	27,550	27,526	99.91	4,266	4,262	867	134
Little Desert	M	Ca	49,361	2,154	4.36	3,804	166	0.4	0
Wells Draw	M	Ca	10,923	2,641	24.18	1,220	295	13	1
Wetlands	I	Ca	18,481	15,398	83.32	1,666	1,388	14	1
Total	**--**	**--**	**203,135**	**114,288**	**--**	**20,179**	**12,514**	**2,709**	**314**

Source: BLM 2012b.
[1] Ca = Cattle; Sh = Sheep
[2] BLM 2012b.
[3] Acreage determined using GIS calculations.
[4] Calculated AUMs determined as follows: Total AUMs x Percent of Allotment in MBPA.
[5] Calculated Existing Disturbance within MBPA determined as follows: Calculated total existing disturbance acres in allotment x Percent of Allotment in MBPA (Example: Antelope Powers: 1,681 calculated acres of existing disturbance x 87.50 percent of allotment in MBPA = 1,470.86 acres).
[6] Calculated AUMs for Existing Disturbance determined as follows: Acres in MBPA / Calculated AUMs in MBPA = Calculated Acres/AUM; Acres of Existing Disturbance within MBPA/Calculated Acres/AUM (Example: Antelope Powers: 39,371 acres/3905 Calculated AUMs in MBPA = 10.1 Acres/AUM; 1471 Acres of Existing Disturbance w/in MBPA / 10.1 Calculated Acres/AUM = 145.63 or 146.

3.9 FISH AND WILDLIFE

3.9.1 Wildlife Habitats

The MBPA and surrounding region support a variety of natural vegetation communities and landscape features that offer a diversity of wildlife habitat types. While these habitat types correspond with the vegetation community types discussed in **Section 3.7** above, they are also defined by a number of distinct landscape features such as washes and gullies, rock outcrops and hillsides, cliffs and taluses, and cave and mine entrances. All these features contribute to the diversity and abundance of wildlife in the area, because they generally provide a microhabitat for wildlife uniquely adapted to or dependent on these features. Although the MBPA encompasses approximately 119,743 acres, past oil and gas development has highly fragmented wildlife habitats in the area.

3.9.2 General Wildlife

Small mammals potentially found within the MBPA and surrounding region include the cottontail rabbit, black-tailed jackrabbit, coyote, badger, striped skunk, western spotted skunk, and various species of rodents and bats. Bird species that may be present include the black-throated sparrow, Say's phoebe, ferruginous hawk, Brewer's sparrow, sage sparrow, grasshopper sparrow, and horned lark. Herptiles potentially found in the region include the wandering garter snake, Great Basin gopher snake, milksnake, Great Basin spadefoot toad, smooth green snake, western whiptail, sagebrush lizard, and shorthorned lizard.

Although all of these species are important members of wildland ecosystems and communities, most are common and have wide distributions within the region. Consequently, the relationship of most of these species to the Proposed Project is not discussed in the same depth as species that are considered threatened, endangered, sensitive, of special economic interest, or are otherwise of high interest or unique value.

3.9.3 Big Game

Three primary big game species are known to occur within the MBPA: pronghorn antelope, mule deer, and Rocky Mountain elk. Habitats and management prescriptions for these species as well as their distribution within the MBPA and surrounding region are described below.

3.9.3.1 Pronghorn Antelope

Pronghorn typically inhabit grasslands and semi-desert shrublands of the western and southwestern United States. The species is common in Utah, where it can be found in desert, grassland, and sagebrush habitats [Utah Division of Wildlife Resources (UDWR) 2009a]. Of these habitats, nearly all pronghorn populations in Utah occur in shrub steppe habitat, where large expanses of low rolling or flat terrain characterize the topography. Pronghorn are typically less abundant in xeric habitats because the abundance of water is important to long-term population viability. Pronghorn habitat in Utah often shows a scarcity of naturally available water (UDWR 2009a). Pronghorn are commonly found in small groups and tend to be most active during the day (UDWR 2009a).

Within the MBPA, pronghorn are the most prominent and widespread big game species. The UDWR manages pronghorn, along with other big game herds within the state, at the Herd Unit level. Pronghorn that occur within the MBPA and surrounding region are considered to be a part of the Nine Mile Herd Unit (Herd Unit #11). The latest (2008) population estimate for Herd Unit 11 was approximately 625 animals, which is below the 5-year objective for this population (UDWR 2009a). The population has been

augmented by recent transplants from other areas, in which the UDWR introduced a total of 115 pronghorn into this herd from 2005 to 2007 (UDWR 2009a).

Pronghorn occupy portions of the MBPA and surrounding region on a year-round basis. They are found in a variety of upland habitats, which are characterized by low rolling, wide-open, expansive areas within shadscale and sagebrush vegetation communities. **Figure 3.9.3.1-1 (Attachment 1)** depicts UDWR-designated pronghorn habitat within the MBPA boundary, which consists of year-long crucial fawning and year-long substantial habitat. **Table 3.9.3.1-1** summarizes pronghorn habitats within the MBPA. Approximately 109,833 acres (92 percent) of the MBPA are designated as year-long crucial fawning habitat for pronghorn. In addition, 1,811 acres (2 percent) of the MBPA are designated as year-long substantial habitat for pronghorn. The remaining acres (6 percent) of pronghorn habitat are unclassified.

Much of the seasonal habitats for pronghorn within the MBPA boundary are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.1-1 – Attachment 1**). Approximately 583 miles of roads and pipelines, 1,671 well pads, and facilities are currently located within year-long crucial fawning and year-long substantial habitat for pronghorn within the MBPA. This has resulted in an estimated 3,514 acres (3.2 percent) and 40 acres (2.2 percent) of surface disturbance to year-long crucial fawning and year-long substantial habitat for pronghorn, respectively within the MBPA.

TABLE 3.9.3.1-1
SUMMARY OF BIG GAME SEASONAL HABITATS WITHIN THE MBPA

Species	Habitat Type	Acres in MBPA	Existing Surface Disturbance (Acres)	Percent of Total Habitat Disturbed within MBPA
Pronghorn Antelope	Year-long Crucial Fawning Habitat	109,833	3,514	3.2
	Year-long Substantial	1,811	40	2.2
Mule Deer	Winter Substantial	5,247	115	2.2
	Year-long Substantial	1,476	48	3.3
	Year-long Crucial Fawning Habitat	2,276	26	1.1
Rocky Mountain Elk	Winter Substantial	10,857	544	5.0
	Year-long Crucial Calving Habitat	7,573	182	2.4

3.9.3.2 Mule Deer

Mule deer are common statewide in Utah. The species can be found in many types of habitat, ranging from open deserts to high mountains to urban areas (UDWR 2008). Typical habitats include short-grass and mixed-grass prairies, sagebrush and other shrublands, coniferous forests, and forested and shrubby riparian areas. Fawn production is closely tied to the abundance of succulent green forage during the spring and summer months, whereas deer are especially reliant on shrubs for forage during the winter (UDWR 2008). Thick-treed habitats may offer shelter from severe weather but offer little in the way of forage (UDWR 2008). Although mule deer are found in a variety of habitats across Utah, they are typically less abundant

in grassland and shrub steppe habitats (UDWR 2008). As such, mule deer habitat is limited within the MBPA.

Mule deer that occupy the MBPA are considered to be part of the Nine Mile Herd Unit (Herd Unit #11). The 2010 population estimate for this herd was approximately 4,600 mule deer, which is approximately 46 percent below the population objective of 8,500 animals (UDWR 2011a).

Mule deer occupy portions of the MBPA on a year-round basis. **Figure 3.9.3.2-1 (Attachment 1)** represents UDWR-designated mule deer habitat within the MBPA boundary. Approximately 2,276 acres in the eastern portion of the MBPA have been identified as year-long, crucial value fawning habitat. An additional 5,248 acres located in the northern portion of the MBPA are designated as substantial value, year-long habitat; and 1,476 acres located in the southwestern portion of the MBPA are designated as winter substantial habitat. **Table 3.9.3.1-1** summaries mule deer habitats within the MBPA. These acreages represent approximately 2, 4, and 1 percent of all lands in the MBPA, respectively. The remaining 110,743 acres (92 percent) of land is unclassified for this species.

As a result of extended drought conditions throughout much of the State from 2000 to 2003, mule deer fawn production was low, and many crucial winter ranges were lost to wildfire during this period (UDWR 2008). In recent years, weather patterns have moderated in portions of the state, and deer herds have slowly increased in those areas. This is evident in the harvest history for Herd Unit 11, which generally reflects an increasing mule deer population from 2005 to 2009; however, the population is still well below the population objective set for this herd (UDWR 2008).

While the extent of seasonal habitats for mule deer are limited within the MBPA boundary, habitats for deer in the MBPA are interspersed with and fragmented by existing oil and gas development. (See **Figure 3.9.3.2-1 – Attachment 1.**) Approximately 53 miles of roads and 88 well pads are currently located within year-long crucial fawning, year-long substantial, and winter substantial habitat for mule deer within the MBPA. This has resulted in an estimated 26 acres (1.1 percent), 48 acres (3.3 percent), and 115 acres (2.2 percent) of surface disturbance within the MBPA to year-long crucial fawning, year-long substantial, and winter substantial habitat, respectively.

3.9.3.3 Rocky Mountain Elk

Elk have an extremely variable diet and can occupy a variety of habitats in Utah (UDWR 2005). Elk are common in most mountainous regions of Utah, where they can be found in mountain meadows and forests during the summer and in foothills and valley grasslands during the winter (UDWR 2005). The species can also be found in the low deserts of Utah (UDWR 2005). Like other members of the deer family, this species relies on a combination of grasses, forbs, and woody plants depending on their availability throughout the year (UDWR 2005). Elk consume mostly grasses and forbs during the summer and browse during the winter (UDWR 2005). Elk are known to occupy desert shrub and pinyon-juniper communities near and along the western boundary of the MBPA. **Figure 3.9.3.3-1 (Attachment 1)** identifies UDWR-designated elk habitat within the MBPA boundary, which consists of crucial value year-long calving habitat and substantial value winter habitat. **Table 3.9.3.1-1** summarizes elk habitats within the MBPA. Approximately 7,573 acres (6 percent) of the MBPA are designated as year-long crucial calving habitat for elk. In addition, 10,857 acres (9 percent) of the MBPA are designated as winter substantial habitat for elk. The remaining 101,413 acres (85 percent) of elk habitat are unclassified.

Elk herds have increased dramatically in Utah over the past 30 years but have generally been more stable in recent years (UDWR 2005). From 2000 to 2003, elk herds were intentionally reduced in many areas of

Utah due to persistent drought and poor range conditions (UDWR 2005). Since then, elk herds have been allowed to re-expand towards, or exceed, their population objectives (UDWR 2005). Elk that occupy the MBPA are considered to be part of the Nine Mile Herd Unit (Herd Unit #11). The 2010 population estimate for this herd was approximately 3,100 elk, which is approximately 135 percent above the population objective of 2,300 animals (UDWR 2011a).

While the extent of seasonal habitats for elk are limited within the MBPA boundary, habitats for elk in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.3-1 – Attachment 1**). Approximately 122 miles of roads and 326 well pads are currently located within crucial value year-long calving and winter substantial habitat for elk within the MBPA. This has resulted in an estimated 182 acres (2.4 percent) and 544 acres (5 percent) of surface disturbance within the MBPA to crucial value year-long calving and winter substantial habitat, respectively.

3.9.4 Upland Game

Upland game has the potential to occur in the MBPA, which include populations of chukar partridge, ring-necked pheasant, California quail, wild turkey, greater sage-grouse, mourning dove, mountain cottontail rabbit, and desert cottontail rabbit. Habitat for these species can be found throughout the MBPA. Annual fluctuations for most upland game populations closely correlate with annual climatic patterns. Mild winters and early precipitation during the spring are associated with increases in upland game populations. Warm, dry weather during the early summer is generally considered vital for the survival of newly born young of many upland game species (UDWR 2000). Many species of upland game (e.g., cottontail rabbits and mourning doves) easily adapt to human disturbance and can often be found near disturbed/built areas such as well sites and along roadsides. However, the greater sage-grouse has experienced a long-term decline as a result of the degradation and loss of important sagebrush steppe habitat (BLM 2004b). The greater sage-grouse is discussed further under **Section 3.10.2.1.6.**

3.9.5 Waterfowl

Waterfowl species that may be found within the MBPA include the Canada goose, mallard, gadwall, cinnamon teal, blue-winged teal, green-winged teal, northern pintail, American wigeon, northern shoveler, and ruddy duck (BLM 2008b). Waterfowl habitat within the MBPA is limited to ponds and wetlands within the Pariette Wetlands ACEC and along the Green River. These areas support habitat capacity of more than 1,718 ducks and 55 geese during annual spring and fall migration each year (Utah Travel Industry 2012). Pelican Lake and Ouray National Wildlife Refuge, northeast of the MBPA, are important wintering areas for waterfowl, because the Green River serves as a migration corridor for much of the waterfowl in eastern Utah.

3.9.6 Migratory Birds, Birds of Conservation Concern, and Utah Partners in Flight Priority Bird Species

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-711) and Executive Order (EO) 13186 (66 Federal Register 3853). Pursuant to EO 13186, a Memorandum of Understanding (MOU) among the BLM and USFWS was drafted to promote conservation and protection of migrating birds. EO 13186 sets forth the responsibilities of federal agencies to implement provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that federal actions evaluate the effects of actions and agency plans on migratory birds.

A list of Birds of Conservation Concern (BCC) was developed as a result of a 1988 amendment to the Fish and Wildlife Conservation Act. This Act mandated that the USFWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA [Endangered Species Act] of 1973." The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions with the recommendation that this list would be consulted on in accordance with EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (USFWS 2008, 2002a). The MBPA is located within BCC Region 16 (Southern Rockies/Colorado Plateau).

The Utah Partners in Flight program has designated several areas along the eastern portion of the MBPA as Bird Habitat Conservation Areas (BHCAs). These BHCAs include the Green River (#37) BHCA, which consists of 463 acres within the MBPA, and the Pariette Wetlands (#26) BHCA, which includes 12,432 acres of the MBPA. BHCAs identify areas where bird habitat conservation projects may take place, predicated on concurrence, collaboration, and cooperation with all landowners involved; however, BHCAs have no official status (IWJV 2005).

Based on preferred habitats (i.e., nesting and foraging habitats) and vegetative communities present in the area, a list of migratory bird species that may use the MBPA has been compiled and is discussed below. Those migratory bird species (including special status raptor species) that are federally listed or candidates for federal listing under the ESA, or are BLM sensitive, are addressed in **Section 3.10** and its subsections. Utah Partners in Flight[2] Priority Species are denoted by an asterisk (*). Non-special status raptor species are addressed in **Section 3.9.7**.

3.9.6.1 Intermountain Basins Mat Saltbush Shrubland, Intermountain Basins Mixed Salt Desert Scrub, and Colorado Plateau Pinyon-Juniper Woodland and Shrubland

The following migratory bird species may be associated with these scrub/shrub communities that comprise the largest proportion of vegetation within the MBPA: black-throated sparrow, black-chinned hummingbird*, common yellowthroat, Lewis's woodpecker, gray flycatcher*, western kingbird, green-tailed towhee, northern mockingbird, Say's phoebe, ferruginous hawk*, and prairie falcon.

3.9.6.2 Intermountain Basins Big Sagebrush Shrubland and Colorado Plateau Mixed Low Sagebrush Shrubland

Although the following birds are often associated with these vegetation communities, they may also use other scrub/shrub vegetation communities as well: Brewer's sparrow*, mountain bluebird, sage sparrow*, grasshopper sparrow*, horned lark, greater sage-grouse*, sage thrasher, and vesper sparrow.

3.9.6.3 Intermountain Basins Shale Badland and Colorado Plateau Mixed Bedrock Canyon and Tableland

Although these birds may forage in other vegetation communities, the following migratory birds may use the badland and rock out crop areas within the MBPA: canyon wren, barn swallow, cliff swallow, common raven, and rock wren.

[2] Utah Partners in Flight is a cooperative partnership among Federal, State, and local government agencies as well as public organizations and individuals organized to emphasize the conservation of birds not covered by existing conservation initiatives.

3.9.7 Raptors

Raptor species that are known to occur within the MBPA and surrounding region year-round or on a seasonal basis include the golden eagle, bald eagle, ferruginous hawk, red-tailed hawk, Swainson's hawk, Cooper's hawk, sharp-shinned hawk, northern harrier, prairie falcon, turkey vulture, American kestrel, great-horned owl, burrowing owl, short-eared owl, long-eared owl, and rough-legged hawk. (BLM 2008b). Most raptor species using the area migrate each fall and return to the region the following spring. Exceptions include the golden eagle and great horned owl, which are year-round residents, and the bald eagle and rough-legged hawk, which are rare winter residents. The most commonly occurring raptor species are the golden eagle and ferruginous hawk, which are frequently seen throughout the MBPA.

Nine raptor species are currently known to nest in the MBPA. These include the golden eagle, ferruginous hawk, red-tailed hawk, Cooper's hawk, sharp-shinned hawk, northern harrier, prairie falcon, burrowing owl, and great-horned owl. Although no nests have been found, four other species that could nest in the area include the American kestrel, Swainson's hawk, short-eared owl, and long-eared owl. Most identified nest sites within the MBPA were located on promontory points (e.g., mesa tops, cliff faces, rock outcrops) in areas with slopes greater than or equal to 30 percent. Some raptor species (e.g., great-horned owl, red-tailed hawk, Cooper's hawk, and sharp-shinned hawk) also use pinyon-juniper woodlands and deciduous trees (e.g., cottonwood, boxelder, and Russian olive trees) for nesting; however, these resources are limited within the MBPA.

Data from past raptor inventories were used to evaluate the level and status of raptor nesting activity within the MBPA (BLM 2009). These inventories were conducted within the region from the period of 1995 to 2008. Results of this information identified some 196 raptor nests within the MBPA. Nest site locations and status of these 196 nests are described in **Table 3.9.7-1**. A total of 72 (37 percent) of the nests were those of golden eagles; 72 (37 percent) were those of ferruginous hawks; 14 (7 percent) were those of red-tailed hawks; 11 (6 percent) were those of burrowing owls; nine (5 percent) were those of prairie falcons; five (3 percent) were those of great-horned owls; three (2 percent) were those of Cooper's hawks; one (less than 1 percent) was that of sharp-shinned hawk; one (less than 1 percent) was that of northern harrier; one (less than 1 percent) was that of short-eared owl; and the remaining eight (4 percent) were unknown as to species.

Of the 196 raptor nests identified within the MBPA, 41 (21 percent) were active for at least some time during the period from 2006 to 2008. Of these active nests, the majority (17 and 18 [85 percent total]) belonged to the golden eagle and ferruginous hawk, respectively. The status of these nests with regard to reproductive success is unknown.

All raptor species and their nests are protected from take or disturbance under the MBTA (16 USC, § 703 et seq.). The golden eagle and bald eagle are also afforded additional protection under the Bald and Golden Eagle Protection Act, as amended in 1973 (16 USC, § 669 et seq.). Because golden eagles, bald eagles, ferruginous hawks, and burrowing owls are considered to be special status raptor species, they are discussed in further detail in **Section 3.10.**

TABLE 3.9.7-1
NUMBER AND ACTIVITY STATUS OF RAPTOR NESTS LOCATED WITHIN THE MBPA

Species	Number of Active Nests[1]	Number of Inactive Nests	Total Number of Nests
Red-tailed Hawk	0	14	14
Golden Eagle	17	55	72
Ferruginous Hawk	18	54	72
Burrowing Owl	2	9	11
Cooper's Hawk	0	3	3
Sharp-shinned Hawk	0	1	1
Northern Harrier	0	1	1
Prairie Falcon	2	7	9
Great-horned Owl	1	6	5
Unknown	1	7	8
Total	**41**	**157**	**196**

[1]Activity status is for the period of 2006 – 2008.

3.10 SPECIAL STATUS SPECIES AND STATE SPECIES OF CONCERN

Special status plant, fish, and wildlife species include those listed as threatened or endangered under the ESA of 1973, as amended; BLM sensitive species; species proposed for listing; species of special concern; other USFWS or BLM species identified as unique or rare; other UDWR or Utah Natural Heritage Program (UNHP) species designated as unique or rare, and which have the potential to occur within the MBPA and surrounding region. The ESA provides protection to federally listed threatened and endangered species from any action that may jeopardize their existence. Species proposed for listing are not protected by the ESA; however, the USFWS works with states, Tribes, private landowners, private partners, and other federal agencies to carry out conservation actions that prevent further decline of proposed species and possibly eliminate the need for the species to be listed.

Under provisions of Section 7 (a)(2) of the ESA (16 U.S.C. Section 1536), federal agencies must ensure that any action authorized, funded, or implemented by the agency does not jeopardize the continued existence of any species listed or result in the destruction or adverse modification of critical habitat of such species. BLM Manual 6840—Special Status Species Policy requires the agency to manage and protect BLM sensitive species, which include: species listed or proposed for listing under the ESA; species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA; species designated as BLM sensitive by the State Director; and all federal candidate species, proposed species, and delisted species in the 5 years following delisting. This policy requires BLM to manage BLM sensitive species to reduce the likelihood for such species to be listed pursuant to the ESA.

Based on examination of USFWS, BLM, UDWR, and UNHP data, a total of 25 special status plant species and 33 special status fish and wildlife species were identified as potentially occurring within the MBPA (refer to **Appendix D** and **Appendix E**). Of the 58 special status plant, fish, and wildlife species that were

evaluated, 18 plant species and 9 fish and wildlife species were eliminated from further consideration in this EIS, because either the geographic or elevational range of the species is located outside of the MBPA and/or the MBPA does not provide suitable habitat for the species. The remaining 31 species that have the potential to occur within the MBPA are retained for further evaluation and include 8 federally listed species and 21 BLM sensitive species and/or UNHP species of concern. (Refer to **Appendix D** and **Appendix E.**) These species are described further below.

3.10.1 Federally Threatened, Endangered, or Proposed Species

Table 3-10.1-1 lists federally listed threatened and endangered species that are identified as potentially occurring within the MBPA. A total of eight species or subspecies of plants and animals are addressed in the EIS, four of which are federally listed as endangered, three of which are federally listed as threatened, and one of which is listed as a candidate species. Critical habitat has been designated for four of these species, as indicated in **Table 3-10.1-1** below.

The evaluation of federally listed threatened and endangered species in this EIS fulfills the compliance requirements of pertinent environmental laws, regulations, and policies in accordance with the requirements of Section 7(b) of the ESA of 1973, as amended, and implementing regulations [16 United States Code (U.S.C.) 1536 (c), 50 CFR 402.12 (f) and 402.14 (c)], and ESA guidance contained in the Endangered Species Consultation Handbook (USFWS and National Marine Fisheries Service 1998).

It is the policy of USFWS to consider candidate species when making natural resource decisions. Consequently, candidate species will be included for consideration in this EIS. Biological information on the above-mentioned species is discussed below.

TABLE 3.10.1-1
FEDERALLY LISTED SPECIES CONSIDERED FOR EVALUATION IN THE EIS/BA

Species	Status	Species Listing		Critical Habitat		Abundance	Primary Habitat Use
		Date Listed	Federal Register No.	Date Designated	Federal Register No.		
Birds							
Yellow-billed cuckoo (*Coccyzus americanus*)	T	October 3, 2014	79 FR 59991	Proposed August 15, 2014	79 FR 48547	Uncommon Summer	Riparian Habitats
Fish							
Colorado pikeminnow (*Ptychocheilus lucius*)	E	March 11, 1967	32 FR 4001	March 21, 1994	59 FR 13374	Rare; Green River is an important nursing area	Riverine & Wetlands/ Bottomlands
Bonytail chub (*Gila elegans*)	E	April 23, 1980	45 FR 27713	March 21, 1994	59 FR 13374	Rare; No wild caught in several years	Riverine
Razorback sucker (*Xyrauchen texanus*)	E	October 23, 1991	56 FR 54957	March 21, 1994	59 FR 13374	Rare; Severely reduced in numbers	Riverine & Wetlands/ Bottomlands
Humpback chub (*Gila cypha*)	E	March 11, 1967	32 FR 4001	March 21, 1994	59 FR 13374	Rare; Severely reduced in numbers	Riverine
Plants							
Uinta Basin hookless cactus (*Sclerocactus wetlandicus*)	T	October 11, 1979	44 FR 58869	N/A	N/A	Uncommon to Common	Dry Gravel Terraces
Pariette Cactus (*S. brevispinus*)	T	Original Listing: October 11, 1979 Revised Listing: September 15, 2009	Original Listing: 44 FR 58868 Revised Listing: 74 FR 47112	N/A	N/A	Occurring only in the Pariette Draw	Clay Badlands
Ute ladies'-tresses (*Spiranthes diluvialis*)	T	January 17, 1992	57 FR 2048	N/A	N/A	Rare	Floodplains and Perennial Stream Terraces

E = Endangered, T = Threatened, C = Candidate

3.10.1.1 Fish and Wildlife

3.10.1.1.1 Western Yellow-billed Cuckoo

The western yellow-billed cuckoo (WYBC) (*Coccyzus americanus*) is listed as a threatened species under the ESA. This species is a neotropical migratory species that breeds in the U.S. and Canada and winters in South America (USFWS 2001). Currently, the range of the cuckoo is limited to disjunct fragments of riparian habitats from northern Utah, western Colorado, southwestern Wyoming, and southeastern Idaho, southward into northwestern Mexico, and westward into southern Nevada and California. Cuckoos are long-range migrants that winter in northern South America in tropical deciduous and evergreen forests (Ehrlich et al. 1988).

Historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin (Ryser 1985, Hayward et al. 1976). The current distribution of WYBCs in Utah is poorly understood, though they appear to be an extremely rare breeder in lowland riparian habitats statewide (Walters 1983, Behle 1981, Benton 1987).

WYBCs are one of the latest migrants to arrive and breed in Utah. They arrive in extremely late May or early June and breed in late June through July. Cuckoos typically start their southerly migration by late August or early September. WYBCs feed almost entirely on large insects that they glean from tree and shrub foliage. They feed primarily on caterpillars, including tent caterpillars. They also feed frequently on grasshoppers, cicadas, beetles, and katydids, occasionally on lizards, frogs, and eggs of other birds, and rarely on berries and fruits (Ehrlich et al. 1988, Kaufmann 1996).

The cuckoo is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Nesting habitat is classified as dense lowland riparian that is characterized by a dense sub-canopy or shrub layer (regenerating canopy trees, willows, or other riparian shrubs) within 300 feet of water. Overstory in these habitats may be either large, gallery-forming trees (30 to 90 feet in height) or developing trees (10 to 30 feet in height), usually cottonwoods. No USFWS proposed critical habitat for this species occurs within the GMBU Project Area. Nesting habitats are found at low to mid-elevations (2,500 to 6,000 feet amsl) in Utah. Cuckoos may require large tracts (100 to 200 acres) of contiguous riparian nesting habitat; however, cuckoos are not strongly territorial and home ranges may overlap during the breeding season. Nests are usually 4 to 8 feet above the ground on the horizontal limb of a deciduous tree or shrub, but nest heights may range from 3 to 20 feet and higher. In Utah, this species nests in riparian areas and has been documented in cottonwood habitat along the Green River.

3.10.1.1.2 Colorado Pikeminnow

The Colorado pikeminnow (*Ptychocheilus lucius*), formerly the Colorado squawfish, is a federally endangered fish species under the ESA. This species is endemic to the Colorado River Basin habitats that are characterized by variable flow, turbulent water, and high silt loads. Within the Colorado River Basin, the Colorado pikeminnow is known to inhabit the Colorado, Green, Duchesne, Price, San Rafael, Gunnison, San Juan, White, and Delores Rivers and numerous associated streams. Today, the species is most abundant in the Green River below the confluence with the Yampa River; the White River from Taylor Draw Dam near Rangely, Colorado, downstream to the confluence with the Green River; and the main stem of the Colorado River from Palisade, Colorado, to Lake Powell. The Gray Canyon and the Yampa River of the lower Green River hold the two critical spawning sites of this species (USFWS 2002b).

The USFWS has designated a total of 726 river miles in Utah as critical habitat for the Colorado pikeminnow. This critical habitat occurs in portions of the Green, Colorado, White, and San Juan Rivers and their respective 100-year floodplains, including portions of the Green River that flow east of the MBPA (USFWS 2007a).

3.10.1.1.3 Bonytail Chub

The bonytail chub (*Gila elegans*) is a federally endangered fish under the ESA. The bonytail chub has historically been a common species along the Colorado River system, but the population has dwindled in recent years (USFWS 1994). This may be due to the introduction of 40 non-native species of riverine fish such as the green sunfish, smallmouth bass, and channel catfish. The bonytail chub is adapted to major river habitats, where it has been observed in slow moving pools and eddies. Flooded bottomland habitat is important for growth and conditioning for young bonytail chub and acts as a nursery or transitioning habitat. There are currently no self-sustaining wild populations of bonytail chub. While very few individuals have been caught in the Upper Colorado River Basin, there have been several individuals caught in the Green River at Hideout Canyon and Gray Canyon, and at the confluence of the Colorado and Green Rivers. The release of hatchery-born bonytail chub into the Upper Colorado River Basin has resulted in low survival, reproduction, and recruitment to the population (USFWS 2002c).

In Utah, the USFWS has designated a total of 139 river miles and their associated 100-year floodplains as critical habitat for the bonytail chub in portions of the Green River and Colorado River. The closest designated critical habitat is located in the Green River, approximately 20 miles downstream from the MBPA (USFWS 2007a).

3.10.1.1.4 Razorback Sucker

The razorback sucker (*Xyrauchen texanus*) is a federally endangered fish species under the ESA. The razorback sucker currently populates the Green River, upper Colorado River, and San Juan River subbasins in the Upper Colorado River Basin. The general population consists of mostly aged adults with minimal recruitment; however, in the middle Green River, where there are juveniles and young adults, there is a low degree of recruitment. The largest population of razorback sucker exists in low-gradient, flat-water reaches of the middle Green River between the confluences with the Duchesne River and the Yampa River (USFWS 2002d). Razorback suckers tend to occupy habitat types such as impounded and riverine areas, eddies, gravel pits, flooded mouths and tributary streams, backwaters, flooded bottoms, and sandy riffles. Adults move into flooded areas in spring to begin spawning migrations as they become reproductively active. Spawning typically occurs over rocky runs and gravel bars (USFWS 2002d).

The USFWS has designated a total of 688 river miles in Utah as critical habitat for the razorback sucker. This critical habitat occurs in portions of the Green, Colorado, Duchesne, White, and San Juan Rivers and their respective 100-year floodplains, including portions of the Green River that flow east of the MBPA (USFWS 2007a).

3.10.1.1.5 Humpback Chub

The humpback chub (*Gila cypha*) is listed as federally endangered fish species under the ESA. In Utah, individuals have inhabited riverine areas from the Upper Green River near Desolation Canyon down to the lower Yampa River, the White River, and the Colorado River below the Glen Canyon Dam. Humpback chub are found in river canyons, where they occupy habitats such as river pools, riffles, eddies, rocky runs, and travertine dams. The densest concentrations of humpback chub are in the Westwater Canyon and Grand

Canyon reaches of the Colorado River. Humpback chub in the Desolation and Gray Canyons of the Green River hold the third most abundant population of this species (USFWS 2002e).

In Utah, the USFWS has designated a total of 139 river miles and their associated 100-year floodplains as critical habitat for the humpback chub in portions of the Green River and Colorado River. The closest designated critical habitat is located in the Green River approximately 20 miles downstream from the MBPA (USFWS 2007a).

3.10.1.2 Plants

3.10.1.2.1 Pariette Cactus and Uinta Basin Hookless Cactus

Both the Pariette cactus and Uinta Basin hookless cactus are federally listed as threatened (USFWS 1979, 2009a). Pariette cactus (Heil and Porter 1994) and Uinta Basin hookless cactus (Hochstätter 1989) were formerly included in the federally threatened *Sclerocactus glaucus* (Schumann) Benson species "complex," but are now recognized by the USFWS as distinct species, each retaining its status as federally threatened (USFWS 2007b, 2009b). Separation of the *S. glaucus* species complex into three distinct species is supported by recent genetic studies (Porter et al. 2000, 2006), common garden experiments (Hochstätter 1993a; Welsh et al. 2003), and morphological characteristics (Hochstätter 1993b, Heil and Porter 2004). The former *S. glaucus* species complex populations now recognized as *Sclerocactus glaucus*, or Colorado hookless cactus, occur entirely within the upper Colorado and Gunnison River valleys of western Colorado (USFWS 1990, 2007b) and will not be addressed here. A recovery plan for Uinta Basin hookless cactus (the *S. glaucus* species complex) was published in 1990 (USFWS 1990), prior to the taxonomic revision of the species complex into three distinct species (USFWS 2009b). Recovery outlines were published in April 2010 for Uinta Basin hookless cactus (USFWS 2010a) and Pariette cactus (USFWS 2010b). The original recovery criteria for the *S. glaucus* species complex are no longer sufficient to address the recovery of the now separated species. As such, newly revised recovery plans for the Uinta Basin hookless cactus and Pariette cactus are in development.

The Pariette cactus and Uinta Basin hookless cactus are discussed in the following sections.

Pariette Cactus

Pariette cactus (*S. brevispinus)* is a perennial that occurs as a solitary, unbranched, egg-shaped to short cylindric succulent stem, usually 0.75–2.75 inches in diameter by 1 to 3 inches tall, that produces pink to purplish flowers from late April to May (Heil and Porter 2004). The Pariette cactus is distinguished from Uinta Basin hookless cactus by its spherical shape, short-hooked or absent central spines, smaller stature, flower size, and retention of juvenile vegetative characteristics in adult flowering plants (Heil and Porter 2004).

The Pariette cactus occurs on fine soils in clay badlands derived from the Uinta Formation within sparsely vegetated salt desert shrubland that is dominated by shadscale, rabbitbrush, and horsebrush from 4,600 to 4,900 feet amsl (USFWS 1990, Heil and Porter 2004). One of the reasons for the susceptibility of Pariette cactus to irreversible population reduction is its specific requirement for habitat with a high percentage of channels on the surface, which form a "desert pavement." Surface disturbance and construction cause the damage or removal of this unique soil substrate, which makes reclamation challenging.

The conservative minimum estimate for the total population of *S. brevispinus* is somewhere in the range of 22,000-29,000 plants within a 204-square-mile (75,400-acre) area from the Pariette Draw along the

Duchesne-Uintah County boundary (USFWS 2012b). Suitable habitat for *S. brevispinus* is not continuous across this area; it is irregularly distributed across the landscape within the area identified as potential habitat. The total area of potential habitat for Pariette cactus is estimated to be about 31,000 acres on BLM lands, and approximately 17,960 acres on Ute Tribal lands (USFWS 2012b). Of the potential *S. brevispinus* habitat on BLM land, 100 percent has been leased for oil and gas development by Newfield Exploration Company and Newfield Energy, which includes the MBPA (USFWS 2012b).

Uinta Basin Hookless Cactus

The Uinta Basin hookless cactus (*S. wetlandicus)* is a perennial that occurs as a solitary, unbranched, round-to-elongate/cylindric succulent stem, usually 1.25–3.5 inches in diameter by 2 to 5 inches tall, that produces pink to violet flowers from late April to May (Heil and Porter 2004). Observed pollinators include bees, beetles, ants, and flies. Seed dispersal vectors include gravity, ants, birds, rodents, precipitation, and surface water flows. It is theorized that seed dispersal is a limiting factor in the distribution of the species (USFWS 1990). Very little is known about the factors affecting the distribution and long-term population dynamics of the Uinta Basin hookless cactus.

Information on the habitat requirements and distribution of this species has been rapidly changing as more studies and surveys are conducted in the Uinta Basin. Currently, the species is known to occur on Quaternary and Tertiary alluvium soils overlain with cobbles and pebbles of the Duchesne River, Green River, and Uinta Formations between 4,500 to 6,600 feet amsl (BLM 2008b, UNPS 2007). It is also found on gravelly hills and terraces, river benches, valley slopes, and rolling hills along the Green, White, and Duchesne Rivers. Preferred habitat is generally associated with Pleistocene outwash terraces with coarse-textured, alkaline soils overlain by a surficial pavement of large, smooth, rounded cobble. It can be found in a range of vegetative communities, including clay badlands, salt desert shrub, and pinyon-juniper woodlands. Associated species include black sagebrush, shadscale saltbush, James' galleta, and Indian ricegrass.

In 2010, the USFWS developed a potential habitat polygon for *S. wetlandicus* and *S. brevispinus* to better assess possible impacts to the species within its range. Although *S. wetlandicus* and *S. brevispinus* populations can be found outside of these areas, they tend to occur at greater numbers and at higher densities within these polygons. The potential habitat polygon is updated annually and was last updated in March 2013 (USFWS 2013).

The total area of potential habitat for *S. wetlandicus* is currently 442,000 acres and includes federal, tribal, state, and private surface lands. Recent geographic data for *S. wetlandicus* includes more than 18,400 points, representing approximately 40,528 individual cacti. Approximately 57,442 acres of USFWS-designated potential habitat for the *S. wetlandicus* has been identified within the MBPA. **Figure 3.10.1.2-1 (Attachment 1)** shows potential cactus habitat areas within the MBPA boundary.

Management Areas for Both Sclerocactus Species

Within known and potential habitat for the Uinta Basin hookless cactus and Pariette cactus, the USFWS has proposed core conservation areas and management recommendations for *S. wetlandicus* and *S. brevispinus* species in response to the ongoing energy development in the Uinta Basin (Appendix I). The purpose of the proposed core conservation areas and management recommendations is to protect the most important populations or sub-populations, and reduce threats to both *Sclerocactus* species. Two levels of core conservation areas were developed based on pollinator travel distance and habitat connectivity between populations and individuals. The core areas are centered on the densest known areas of *Sclerocactus* within

a 400 meter (approximately 1,312 foot) buffer for Level 1 and 1,000 meter (approximately 3,821 foot) buffer for Level 2 areas. The Level 1 and Level 2 polygons were developed using kernel density analysis found in GIS software.

The distances used to develop core conservation areas were based on travel distances of common bee species that visit individual plants. These bees are in the small and medium size range and travel approximately 400 to 1,000 meters between plants and nests (Tepedino et al. 2010). Level 1 polygons were developed using a 400-meter buffer around plants to allow for pollinator travel. They include the densest concentrations of cactus locations and the most restrictive management recommendations as proposed by USFWS. Level 2 polygons were developed using a 1,000-meter buffer around plants while incorporating less-dense cactus areas and less restrictive management recommendations as proposed by USFWS. It is important to note that at the time this document was developed, these proposed measures are interim management recommendations that have not been finalized or formally adopted as standard mitigation practices by the BLM.

Approximately 7,484 and 12,955 acres of Level 1 and 2 Core Conservation Areas occur within the MBPA, respectively. Much of the potential habitat for *Sclerocactus*, including Level 1 and 2 Core Conservation Areas, is interspersed with and fragmented by existing oil and gas development (see **Figure 3.10.1.2-1 – Attachment 1**). According to UDOGM's database as of January 2015, there are currently 594 wells[3] located within Core Conservation Areas within the boundaries of the MBPA (162 wells in Level 1 and 432 in Level 2). The USFWS and Newfield have differing opinions on the amounts of existing surface disturbance within the Core Conservation Areas.

The USFWS applies an estimate of 5 acres per well. Using USFWS' assumptions, there are approximately 810 acres and 2,160 acres of existing disturbance within Level 1 and Level 2 Core Conservation Areas, respectively, within the MBPA boundary. It is important to note, however, that this value is highly likely to be an overestimate, as the UDOGM database does not account for multi-well pads.

Newfield estimated existing disturbance using a combination of aerial imagery, vendor data, plats, and as-built engineering diagrams. Using Newfield's assumptions, there are approximately 318.8 acres and 573.8 acres of existing disturbance within Level 1 and Level 2 Core Conservation Areas, respectively, within the MBPA boundary.

Existing surface disturbance within the entire Upper and Lower Pariette Core Conservation Area (i.e., MBPA and EDA #1 areas) is discussed in cumulative impacts in Chapter 5.0.

3.10.1.2.2 Ute Ladies'-tresses

Ute ladies'-tresses (*Spiranthes diluvialis*) is a federally listed threatened species. A member of the orchid family, this perennial herb occurs on seasonally flooded river terraces, spring-fed stream channels, lakeshores, and in human-modified and disturbed wetlands such as canals, gravel pits, and irrigated meadows (Fertig et al. 2005). Within the Uinta Basin, Ute ladies'-tresses occurs along the Green River near the confluence with the Yampa River, and along Ashley Creek, Big Brush Creek, and the upper Duchesne River and its tributaries (BLM 2005a) above 4,300 feet amsl (BLM 2007c). Ute ladies'-tresses populations require recurrent disturbance, such as seasonal flooding, grazing, or mowing for establishment and

[3] UDOGM well count includes wells in the following categories: shut-in, producing, drilling, abandoned, temporarily abandoned, active, inactive, location abandoned, and drilling operations suspended.

persistence and often occur in recently created riparian habitats such as sand bars and backwaters (USFWS 1995a).

There are currently no known occurrences of the species within the MBPA. However, the MBPA is included within the range of the species because it is known to occur in Duchesne and Uintah Counties (Fertig et al. 2005, UNPS 2007, UDWR 2007). Potential habitats within the Project Area include riparian areas, alluvial cobbles or shingles backed by native cottonwoods, and within portions of the Pariette Wetlands.

3.10.2 BLM Sensitive Species and Utah State Species of Concern

Appendix D and **Appendix E** provide a list of BLM sensitive species and Utah State species of concern that are identified as potentially occurring within the MBPA. A total of 21 plant, fish, and wildlife species are addressed in the EIS. This includes four species of mammals, 10 species of birds, three species of fish, and four plant species.

3.10.2.1 Fish and Wildlife

3.10.2.1.1 Fringed Myotis

The fringed myotis is listed as a BLM sensitive species and UDWR Wildlife Species of Concern (SPC). This species occurs in low desert scrub to fir-pine associations and oak and pinyon-juniper woodlands from 2,400 to 8,900 feet amsl (Oliver et al. 2009). This mammal roosts in caves, mines, and buildings and is most commonly associated with water courses and lowland riparian areas (UDWR 2006a). The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation type covers approximately 4,832 acres of land within the MBPA, which may contain cliffs and rock crevices that are suitable for roosting.

In Utah, this species is known to occur in Washington, Garfield, Kane, San Juan, Uintah, and Grand Counties (UDWR 2006a). A few scattered observations of the species have been documented in Uintah County. Approximately 82,156 acres of suitable riparian, desert shrub, and pinyon-juniper woodlands habitats are present within the MBPA. Roosting locations are likely to be present, but none have been identified by the UDWR or BLM. The species has not been documented within the MBPA; however, based on the known range and the presence of suitable habitats, this species has the potential to occur within the MBPA.

3.10.2.1.2 Spotted Bat

The spotted bat is listed as a BLM sensitive species and UDWR SPC. This species occurs in montane forests, pinyon-juniper woodlands, and open semi-desert shrublands from 2,700 to 9,200 feet amsl (Oliver et al. 2009). Approximately 89,384 acres of suitable foraging habitat has been identified within the MBPA. This species uses crevices in rocky cliffs for roosting habitat, ponderosa pine woodlands during the reproductive season, and lower elevations at other times of the year (Fitzgerald et al. 1994). The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation type covers approximately 4,832 acres of land within the MBPA, which may contain cliffs and rock crevices that are suitable for roosting. This species is rare in Utah and has not been documented within the MBPA; however, based on the known range and the presence of suitable habitats, this species has the potential to occur within the MBPA.

3.10.2.1.3 Townsend's Big-eared Bat

The Townsend's big-eared bat is listed as a BLM sensitive species and UDWR SPC. This species occupies semi-desert shrublands, pinyon-juniper woodlands, and open montane forests from 3,300 to 8,800 feet amsl (Oliver et al. 2009). Approximately 82,156 acres of suitable foraging habitat has been identified within the MBPA. This species uses caves and abandoned mines for day roosts, but also uses abandoned buildings and rock crevices for refuge (Fitzgerald et al. 1994). The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation type covers approximately 4,832 acres of land within the MBPA, which may contain cliffs and rock crevices that are suitable for roosting. This species occurs throughout Utah including Uintah County (UDWR 1998). Since the nearest documented occurrence of this mammal is from the Ouray National Wildlife Refuge located northeast of the MBPA (BLM 2008b), this species is likely to occur within the MBPA.

3.10.2.1.4 Big Free-tailed Bat

The big free-tailed bat (*Nyctinomops macrotis*) is listed as a BLM sensitive species and UDWR SPC. The big free-tailed bat is not commonly found in Utah; however, when present, is most often sighted in the southern half of the state. Individual bats have been sighted in north-central Utah, though these occurrences are rare (Oliver 2000). As a migratory species, big free-tailed bats are typically present in Utah during the summer (UDWR 2007). Associated habitats are defined as lowland riparian, desert shrub, and montane forest vegetation communities. Crevices in caves and along cliffs along the Green River corridor serve as potential suitable roosting sites within the Uinta Basin (Oliver 2000). The big free-tailed bat may utilize shrub and riparian woodland habitats within or near the MBPA for foraging. Rock outcrops and ridges within the MBPA and along the Green River outside the MBPA represent suitable roosting habitat for this species. Big free-tailed bats have the potential to occur within the MBPA.

3.10.2.1.5 White-tailed Prairie Dog

The white-tailed prairie dog is listed as a BLM sensitive species and UDWR SPC. In May 2010, the USFWS was petitioned to federally list the white-tailed prairie dog, but the agency subsequently determined that the species does not warrant protection as a threatened or endangered species under the ESA.

Colonies of this species occur primarily in mountain valleys, semi-desert grasslands, and open shrublands (Fitzgerald et al. 1994). They are distributed in relatively large, sparsely populated complexes and live in loosely knit clans (UDWR 2006b). White-tailed prairie dogs usually occupy areas that are higher in elevation than other prairie dog species, such as black-tailed prairie dogs (*Cynomys ludovicianus*). In Utah, the white-tailed prairie dog occurs predominantly in the Uinta Basin and the northern part of the Colorado Plateau. This species is the main food source of the endangered black-footed ferret (*Mustela nigripes*) (Fitzgerald et al. 1994).

The UDWR and BLM have mapped prairie dog colonies in portions of Uintah and Duchesne Counties to identify suitable habitat. As a result of this effort, some 9,701 acres of white-tailed prairie dog colonies were mapped within the MBPA, the largest of which is 2,375 acres in size. **Figure 3.10.2.1.4-1 (Attachment 1)** depicts the distribution and size of the known colonies within the MBPA. These colonies are considered to be part of the Myton Bench prairie dog complex.

3.10.2.1.6 Greater Sage-grouse

Widespread declines in greater sage-grouse populations throughout the West led to a petition to list the species as threatened under the ESA. Based on accumulated scientific data and new peer-reviewed information and analysis (USFWS 2010c), the USFWS published a finding in the *Federal Register* (50 CFR 17) on March 5, 2010, stating that the greater sage-grouse warrants the protection of the ESA, but listing the species is precluded by the need to address higher-priority species first. The greater sage-grouse was placed on the candidate list for future action, meaning that the species will not receive statutory protection under the ESA at this time, and states will continue to be responsible for managing the species. The species is currently listed as a BLM sensitive species.

In Utah, the greater sage-grouse inhabits upland sagebrush grasslands, foothills, and mountain valleys (BLM 2008b, UDWR 2009b). Depending on the season, weather, and nutritional requirements, this species occupies different habitat types during the year. Important areas for sage-grouse are the leks, brood rearing areas, and wintering areas. Leks may be located between summer and winter ranges, or in some cases summer and winter ranges may be the same (Call and Maser 1985). Preferred nesting habitat occurs up to a 5-mile radius from the leks (Connelly et al. 2000).

Nesting habitats consists of shallow depressions lined with grass or twigs and are usually located under sagebrush. The principal sage-grouse winter food is sagebrush leaves. During the summer, greater sage-grouse feed on the leaves and fruiting heads of sagebrush; the flower heads of clovers, dandelions, grasses, and other plants; and various insects (Kauffman 1996, UDWR 2002). Greater sage-grouse feed almost exclusively on sagebrush in the winter (Connelly et al. 2000, Patterson 1952), and therefore are mostly restricted to sagebrush habitats during that season. Because sage-grouse need to access sagebrush, winter habitat tends to exist on south- to west-facing slopes that are less than 10 percent slope and are generally located in windswept areas (Beck 1977, Crawford et al. 2004), where the height of sagebrush exceeds the depth of snow.

The BLM Washington Office IMs No. 2012-043 and 2012-044 (BLM 2011b, 2011c) supplement the BLM's 2004 National Strategy for sage-grouse and identify those management actions necessary to sustain sage-grouse populations, while achieving the DOI's energy-related priorities. The UDWR has not yet identified priority habitat using a consistent methodology. A priority habitat designation is the highest conservation value that can be given relative to maintaining suitable sage-grouse populations range-wide. The Governor's task force finalized the Conservation Plan for Greater Sage Grouse in Utah in February 2013. The Plan identifies Preliminary Priority Habitat (PPH) and the Preliminary General Habitat for sage-grouse in accordance with IM 2012-044. Neither of these habitats are mapped within the MBPA. No habitats designated as occupied, brood rearing, or winter habitats for sage-grouse occur within the MBPA. However, a historic sage-grouse lek is located in the MBPA. The lek is known as the Myton Bench – Wells Draw lek and was last reported active in 1999, with six males in attendance (BLM 2009b).

3.10.2.1.7 Bald Eagle

Effective August 8, 2007, the USFWS delisted the bald eagle in the lower 48 states from the Federal List of Endangered and Threatened Wildlife (72 FR 37346, USFWS 2007c). However, the bald eagle is protected under the Bald and Golden Eagle Protection Act and the MBTA. In Utah, bald eagles primarily nest in cottonwood-dominated riparian areas. Individuals nest in large trees or snags with sturdy branches in areas that provide adequate food (fish and carrion) and access to open water. During non-breeding periods (especially during the winter), bald eagles are relatively social and roost communally in sheltered stands of

trees. Wintering areas are commonly associated with open water, though other habitats can be used if food resources such as rabbit or deer carrion are readily available.

Although no bald eagle nesting sites exist within or near the MBPA, a number of documented winter roost sites are located along the Pariette Draw and Green River, inside and outside the MBPA. Specifically, three bald eagle roosting sites were identified within the MBPA and six were identified within 1.7 miles of the MBPA along the Green River (BLM 2009). Winter roosting usually occurs from early November through late March, and bald eagles may use portions of the MBPA as foraging habitat during this period.

3.10.2.1.8 Golden Eagle

The golden eagle is protected by the Bald Eagle and Golden Eagle Protection Act and the MBTA. This species ranges throughout western North America in open, mountainous country and is quite common in Utah (UDWR 2007). The breeding season occurs from late February to March, with nests constructed on cliffs or in large trees (UDWR 2007). The species is sensitive to disturbance to its nesting area; nests are usually a minimum of 0.5 mile apart, and the average territory size is approximately 20 to 55 square miles (NatureServe 2007). The species feeds on rabbits, marmots, and ground squirrels but may also eat a variety of other prey, including insects, snakes, birds, juvenile ungulates, and carrion (NatureServe 2007). Populations of golden eagles in Utah are considered to be year-round residents.

Data from past raptor inventories were used to evaluate the level and status of golden eagle nesting activity within the MBPA (BLM 2009). These inventories were conducted within the region from the period of 1995 to 2008. Results of this information identified some 72 golden eagle nests within the MBPA. Of these, 17 (24 percent) were active for at least some time during the period from 2006 to 2008. Because suitable nesting and foraging habitat is found throughout the MBPA, additional breeding golden eagles could establish territories/nests in the future.

3.10.2.1.9 Ferruginous Hawk

The ferruginous hawk is listed as a BLM sensitive species and UDWR SPC. This species habitat includes grasslands, agricultural lands, sagebrush/saltbush/greasewood, shrublands, and the periphery of pinyon-juniper woodlands. In Utah, the breeding season for ferruginous hawks is March 1 to August 1. Nesting habitat includes trees, cliffs, low hills and knolls, as well as buttes in close proximity to areas with a large prey base such as prairie dogs and jackrabbits (Johnsgard 1990). Nesting sites generally are in areas of high visibility, which makes the ferruginous hawk sensitive to human development. Nesting areas in close proximity to human development are characteristic of lower productivity during reproductive periods (Collins and Reynolds 2005).

Data from past raptor inventories were used to evaluate the level and status of ferruginous hawk nesting activity within the MBPA (BLM 2009). These inventories were conducted within the region from the period of 1995 to 2008. Results of this information identified some 72 ferruginous hawk nests within the MBPA. Of these, 18 (25 percent) were active for at least some time during the period from 2006 to 2008.

3.10.2.1.10 Short-eared Owl

The short-eared owl is listed as a BLM sensitive species and UDWR SPC. The species breeds in the northern half of Utah, mostly in the northwestern portion of the state, but can be found throughout Utah during non-breeding periods (UDWR 2003). The species is less common in eastern Utah. Local breeding status can be difficult to assess due to the species' tendency to breed opportunistically in response to high

rodent densities (UDWR 2003). This owl starts nesting in April on the ground in a small depression excavated by the female (Ehrlich et al. 1988).

Several individual short-eared owls, nest sites, and suitable habitat have been identified within MBPA. Data from past raptor inventories that were conducted within the region from the period of 1995 to 2008 (BLM 2009) documented a single short-eared owl nest within the MBPA, although it is likely that additional undocumented nests occur in the area.

3.10.2.1.11 Burrowing Owl

The burrowing owl is listed as a BLM Sensitive Species and UDWR SPC. Burrowing owls are summer residents on the plains over much of Utah and usually arrive on breeding grounds from late March to mid-April (Johnsgard 2002). Burrowing owls are relatively tolerant of human activity and have been known to make their homes in cow pastures, fields surrounding airports, ranch and farm land, or in close proximity to highways. In addition, burrowing owls serve as prey for larger raptors, foxes, and coyotes. Burrowing owl individuals, nest sites, and suitable habitat have been identified within MBPA. Data from past raptor inventories that were conducted within the region from the period of 1995 to 2008 (BLM 2009) documented 11 burrowing owl nests within the MBPA, although many more undocumented nests are likely to occur in the area. Approximately 9,701 acres of mapped white-tailed prairie dog colonies exist within the MBPA, which serve as suitable habitat for the burrowing owl.

3.10.2.1.12 Lewis's Woodpecker

Lewis's woodpecker is listed as a BLM sensitive species and UDWR SPC because of its limited distribution within the state and recent range-wide decreases in population size. This woodpecker is a permanent resident to western North America. In the State of Utah, it is found primarily in the riparian habitats of the Uinta Basin and along the Green River. Approximately 6,843 acres of potential woodland habitat have been identified within the MBPA. Lewis's woodpecker is widespread in Utah but is an uncommon nester along the Green River. Breeding behavior for this species has been observed in Ouray and Uintah Counties and along Pariette Wash (Kingery 1998, UDWR 2011b). The species dwells in pine forests, riparian areas, and pinyon-juniper woodlands. The breeding season for Lewis's woodpecker is mid-May to mid-August. Breeding occurs in ponderosa pine and cottonwood woodlands in stream bottoms and farm areas.

3.10.2.1.13 American White Pelican

The American white pelican (*Pelecanus erythrorhynchos*) is listed as a BLM sensitive species and UDWR SPC. This species also is protected under the MBTA. Geographically this species is found in the northern part of Utah and is generally concentrated around the Great Salt Lake and Utah Lake. As a migratory species, the American white pelican is present in northern Utah during fall and spring migrations. American white pelicans primarily select nesting habitat in Utah on islands, with a preference for those found in fresh water lakes. Foraging habitat in Utah is defined as shallow lakes, marshlands and rivers, as the preferred diet of the American white pelican is shallow water fish. Breeding areas are often distant from foraging areas and are usually separated by a buffer greater than 50 kilometers (UDWR 2007). While no nesting habitat is located within the MBPA, the American white pelican may utilize foraging habitat within the Green River, and the species may occur in the MBPA.

3.10.2.1.14 Long-billed Curlew

The long-billed curlew (*Numenius americanus*) is listed as a BLM sensitive species and UDWR SPC. This species also is protected under the MBTA. As a migratory bird, this species is only present in Utah during the summer, usually arriving in March, and most often inhabits the central and northern valleys of the state. The long-billed curlew is not common within the Colorado River drainage as it prefers to breed in higher and drier meadowlands (UDWR 2007). This species preferred breeding habitat consists of dry grasslands with sufficient cover and a high occurrence of prey species (Pampush 1980). Uncultivated grasslands and pastures are significant habitats for continental long-billed curlew breeding populations (Johnsgard 1981). The long-billed curlew diet typically includes crustaceans, mollusks, worms, toads, insects, and less often berries and nesting birds (UDWR 2007).

While not common in the Colorado River watershed, long-billed curlews have been observed nesting in the Ouray National Wildlife Refuge (USFWS 2000). Potential nesting and foraging habitat does exist within the MBPA within grassland areas and along the Green River and Pariette Draw; however, potential for this species to occur within the MBPA is low.

3.10.2.1.15 Mountain Plover

In addition to being listed as a UDWR SPC, the mountain plover is listed as a Utah Partners in Flight (UPIF) priority species (Parrish et al. 2002), and a Utah Natural Heritage Program Critically Imperiled S1 species (UDWR 2010b). The species is also listed as a BCC for the USFWS Mountain-Prairie Region (USFWS 2008). The mountain plover was originally proposed as threatened under the ESA in 1999, but the proposal was withdrawn in 2003. The proposed rule for listing was reinstated in 2010, but it was determined in May 2011 that the species does not warrant protection under the ESA (USFWS 2011).

Most of the mountain plover breeding range is in Colorado, Montana, and Wyoming. However, one known historic breeding population has been documented in Utah on Myton Bench in Duchesne County. In Utah, individuals in this population have shown consistent site fidelity, returning to the same breeding site year after year (Manning and White 2001). However, the population has declined greatly in recent years, with no breeding bird sightings since 2005 (UDWR 2011b).

As shown in **Figure 3.10.2.1.12-1 (Attachment 1)**, approximately 75,701 acres were identified as suitable mountain plover habitat and 455 acres as concentration areas for the species within the MBPA. Utah mountain plovers differed in habitat choice from the traditional shortgrass prairie that was generally associated with the species, preferring instead a shrub-steppe habitat type. Breeding birds in this region were found among white-tailed prairie dogs and near roadways or oil well pads (Manning and White 2001).

3.10.2.1.16 Roundtail Chub

The roundtail chub is listed as a BLM sensitive species and a Utah State sensitive species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing. Roundtail chub is found in the UCRB. This species is a large member of the minnow family found most often in major rivers and smaller tributary streams. The roundtail chub has been described as varying from sedentary to mobile, depending on life stage and habitat conditions (Sigler and Sigler 1996).

Roundtail chub populations occur in the Green River from the Colorado River confluence upstream to Echo Park and in the White River from the Green River confluence upstream to near Meeker, Colorado. In the UCRB (states of Utah, Wyoming, Colorado, and New Mexico), the species has been extirpated from about

45 percent of its historical range, including the White River and portions of the San Juan, Gunnison, and Green Rivers. Data on smaller tributary systems are largely unavailable, and population abundance estimates are available only for short isolated river reaches. Known distribution of this species includes portions of the Green River east of the MBPA (UDWR 2007).

3.10.2.1.17 Bluehead Sucker

The bluehead sucker is listed as a BLM sensitive species and a Utah State sensitive species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing. Bluehead sucker is found in the UCRB. This fish occurs in small to large streams, rivers, and tributaries in the Upper and Lower Colorado River Basin, including the Green River. Large adult bluehead may inhabit stream environments as deep as 6 to 9 feet, although they most commonly feed in riffles and swift runs. Spawning occurs in spring and early summer at lower elevations and mid- to late-summer in higher, colder waters. Spawning occurs on gravel beds in shallow water (Sigler and Sigler 1996).

Populations of this species currently occur in the mainstream Green River from the Colorado River confluence upstream to Lodore, Colorado, and in the White River from the Green River confluence upstream to Meeker, Colorado. In the UCRB, bluehead suckers currently occupy about 45 percent of their historical habitat. Recent declines of the species have occurred in the White River below Taylor Draw Dam and in the upper Green River. Known distribution of this species includes portions of the Green River east of the MBPA (UDWR 2007).

3.10.2.1.18 Flannelmouth Sucker

The flannelmouth sucker is listed as a BLM sensitive species and a Utah State sensitive species receiving special management under a Conservation Agreement in order to preclude the need for a federal listing. Flannelmouth sucker is found in the UCRB. This species typically inhabit deep water habitats of large rivers, but are also found in small streams and occasionally in lakes. Flannelmouth suckers spawn during March and April in the southern portions of Utah and from May to June in northern Utah at higher elevations (Sigler and Sigler 1996).

Flannelmouth sucker populations can be found in the Green River from the Colorado River confluence upstream to the Flaming Gorge Reservoir, and in the White River from Taylor Draw in Colorado to the Green River. Recent investigations of historical accounts and museum specimens indicate that flannelmouth suckers occupy approximately 50 percent of their historic range in the UCRB. Populations have declined since the 1960s due to impoundment of the Green River in Wyoming and Utah (Flaming Gorge Reservoir) and the Colorado River in Glen Canyon, Utah (Lake Powell). The known distribution of this species includes portions of the Green River east of the MBPA (UDWR 2007).

3.10.2.2 Plants

3.10.2.2.1 Barneby's Catseye

Barneby's catseye (*Cryptantha barnebyi*) is a BLM sensitive plant species. This perennial herb is a member of the borage family that inhabits regions with oil shale, gently sloping white shale barrens, and the semi-barren shale knolls of the Green River Formation. Due to the limits of soil requirements, this species is endemic to the Uinta Basin. This plant is generally associated with pinyon-juniper, shadscale, rabbitbrush, and sagebrush communities at elevations between 6,000 and 7,900 feet amsl (UNPS 2009).

While little is known about the habitat requirements for this species, suitable habitat exists within the MBPA based on the vegetation, soil, and elevation associations required by the species. These conditions give Barneby's catseye a moderate potential for occurrence within the MBPA. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, off-highway vehicle (OHV) travel, and grazing (BLM 2012b).

3.10.2.2.2 Graham's Catseye

Graham's catseye (*Cryptantha grahamii*) is a BLM sensitive plant species. This species is a long-lived perennial that belongs to the borage family and typically flowers between May and June. Graham's catseye inhabits Green River Shale soils, which make it endemic to Uintah and Duchesne Counties in the Uinta Basin. This plant is often found in mixed sagebrush, desert shrub, mountain brush, and pinyon juniper vegetation communities that occur at elevations between 5,000 to 7,400 feet amsl (UNPS 2007).

Not much information exists on the species habitat requirements and population dynamics (UNPS 2009). However, the formation and soils known to serve as habitat for Graham's catseye are found in the area and provide a moderate potential for occurrence within the MBPA. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, OHV travel, and grazing (BLM 2012b).

3.10.2.2.3 Green River Greenthread

The Green River greenthread (*Thelesperma pubescens var. caespitosum*) is a BLM sensitive plant species. This member of the sunflower family is endemic to Duchesne County. Its habitat consists of white shale slopes and ridges of the Green River Formation at elevations between 5,900 feet to 8,400 feet amsl (UNPS 2007).

While little is known about the specific habitat requirements for this species, there is a moderate potential that suitable habitat exists within the MBPA based on the vegetation, soil, and elevation associations required by the species. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, OHV travel, and grazing (BLM 2012b).

3.10.2.2.4 Sterile Yucca

The sterile yucca (*Yucca sterilis*) is listed as a BLM sensitive species. It is a member of the agave family and produces yellow- to cream-colored flowers. This species produces vegetatively through root stems that branch into new plants. Sterile yucca are found in salt desert shrub, sagebrush, juniper, and shadscale communities at elevations between 4,800 to 5,800 feet amsl (UNPS 2007).

There is a moderate potential that suitable habitat for this species exists within MBPA based on the vegetation, soil, and elevation associations required by the species. Potential threats to this species include habitat loss and fragmentation as a result of oil and gas development, mineral and building material development, road development, OHV travel, and grazing (BLM 2012b).

3.11 CULTURAL RESOURCES

Cultural resources are defined as both prehistoric and historical archaeological sites and structures, as well as non-archaeological and non-structural sites (i.e., waterways, viewsheds, and resource areas) that have

been identified as important for traditional and/or ideological reasons by the Native American groups with ancestral and/or present ties to the area.

Prehistoric and historic sites and structures are the tangible remains of past activities that show use or modification by people. They are distinct geographic areas that can include artifacts, features (for example, hearths, rock alignments, trails, rock art, railroad grades, canals and roads), landscape alterations, or architecture. Many of these cultural resources have multiple associations and use values. These non-renewable resources provide a record of prehistoric and historical cultures and events and have use values for many contemporary groups, including local residents, scientists, and Native Americans.

Unless otherwise noted, the information in this section has been adapted from the *Class I Existing Data Review for Newfield Exploration and Production's Greater Monument Butte Project Area, Duchesne and Uintah Counties, Utah* (Montgomery Archaeological Consultants, Inc. [MOAC] 2011).

3.11.1 Area of Potential Effects

In accordance with 36 CFR 800, theimplementing regulations for the National Historic Preservation Act (NHPA), an Area of Potential Effect (APE) has been established within which direct and indirect effects on cultural resources resulting from the Proposed Action and Alternatives could occur (ACHP 2004). The APE consists of the MBPA, which is bordered to the north by Pleasant Valley, to the south by Eightmile Flat, to the east by the Green River, and to the west by Wells Draw (see **Figure 1-1 – Attachment 1**).

3.11.2 Prehistoric Resources

The prehistoric-chronological sequence represented within the MBPA includes the Paleo-Indian, Archaic, Fremont, and Protohistoric stages. The earliest inhabitants of the region are representative of the Paleo-Indian stage (ca. 12,000-8000 B.P.), which is characterized by the adaptation to terminal Pleistocene environments and the exploitation of big game fauna. The discovery of Clovis and Folsom fluted points (ca. 12,000 B.P. - 10,000 B.P.), as well as the more recent Plano Complex lanceolate points (ca. 10,000 B.P. - 7000 B.P.), implies the presence of Paleo-Indian hunters in the Uinta Basin region.

The Archaic stage (ca. 8000 B.P.-1500 B.P.) relates to the dependence on a foraging subsistence, with people seasonally exploiting a wide spectrum of plant and animal species in different ecozones. The shift to an Archaic lifeway was marked by the appearance of new projectile point types and the development of the atlatl, perhaps in response to a need to pursue smaller and faster game.

The Formative stage (A.D. 500-1300) is recognized in the area as the Uinta Fremont. This stage is characterized by reliance upon domesticated corn and squash, increasing sedentism, and substantial habitation structures, pottery, and bow and arrow weapon technology during its later periods. Traits considered unique or predominate to the Uinta Basin include calcite-tempered pottery, two-handled wide-mouth vessels, Utah type metates, the use of Gilsonite for pottery repair, settlement on tops of buttes, and large-shouldered bifaces.

For the Protohistoric stage, the archaeological evidence suggests that Numic people appeared in east-central Utah at approximately A.D. 1100 or shortly before the disappearance of Formative-stage people. The archaeological remains of Numic-speaking Utes consist primarily of lithic scatters with low quantities of brown ware ceramics, rock art, and occasional wickiups. The Ute appear to have been hunters and gatherers who exploited various fauna and flora resources.

3.11.3 Historical Resources

The earliest recorded visit by Europeans to Utah was the Dominguez-Escalante expedition of 1776. From the early 1820s to 1845, the Uinta Basin became an important part of the expanding fur trade in the West.

3.11.3.1 Duchesne County

During the 1880s, the U.S. Army established the earliest permanent European settlements and associated developments within what would later become Duchesne County. The area was gradually opened up for settlement by giving applicants the opportunity to claim land grants of 160 acre parcels under the Homestead Act. The origin of the Price-Myton Freight Road began with the establishment of Fort Duchesne in 1886. Because the 300 or so troops stationed at this remote fort required a means of acquiring supplies, a service route was chosen that essentially linked the fort to the developing market center of Price. The discovery of Gilsonite in the area sparked the development of Gilsonite mines and boosted the freight road. By 1905, the Uintah Railway had constructed a spur from Mack, Colorado to Dragon, Utah to capture some of the Gilsonite mining transportation. A number of mines were developed in subsequent years but were abandoned in the late 1960s.

3.11.3.2 Uintah County

Beginning in the 1850s, livestock was the main industry of white homesteaders in Uintah County. The K Ranch, a large cattle operation owned by P.R. Keiser, brought many cowboys to the area. The ranch was located on the Utah-Colorado line with property in both states. The sheep industry later became part of Uintah County's economic backbone and contributed to the decline of the cattle industry. Sheep were first introduced to the valley during the winter of 1879, when Robert Bodily brought in sixty head. By 1906, the Uintah Railway Company built shearing pens on the Green River to encourage the shipping of wool by train. In addition, shearing pens were built in 1912 in the communities of Bonanza and Dragon, Utah. During the 1940s, Mexican sheep-shearing crews and Greek sheepmen from the Price and Helper areas came into the area. The Taylor Grazing Act was passed in 1934, which allotted specific areas or "districts" to stockmen for livestock grazing that required permits. This act was a forerunner of the BLM agency, which was established in 1946 and eventually assumed responsibility for the administration of grazing laws on public land.

3.11.4 Regulatory Framework

Federal legislation for historic preservation provides a legal environment to document, evaluate, and protect cultural resources that may be affected by federal undertakings, or by private undertakings operating under federal license, with federal funding, or on federally managed lands. These include the NHPA (16 U.S.C. 470), as amended; the Archaeological and Historic Preservation Act (AHPA) of 1974 (16 U.S.C.469-469c); and the ARPA (16 U.S.C. 470aa-470mm), as amended. Executive Order 11593 also provides necessary guidance on the protection and enhancement of cultural resources.

The NHPA requires federal agencies to take into account the effects of their actions on properties listed or eligible for listing on the NRHP. Section 106 of the NHPA establishes a four-step review process through which cultural resources are given consideration during the evaluation of proposed undertakings. The regulations require that federal agencies initiate Section 106 early in the project planning when a broad range of alternatives can be considered (36 CFR 800.1[c]).

3.11.5 Eligibility Criteria for Listing Cultural Resources on the NRHP

The NPS, on behalf of the Secretary of the Interior, maintains the NRHP, the nation's inventory of significant cultural resources. The NPS has established three main standards that a cultural resource must meet to qualify for listing on the NRHP: age, integrity, and significance. To meet the age criteria, a cultural resource generally must be at least 50 years old, except in special circumstances. To meet the integrity criteria, a cultural resource must "possess integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR 60.4). Finally, to qualify for significance, a cultural resource must meet one or more of the following evaluation criteria (NPS 1995):

- Be associated with events that have made a significant contribution to the broad patterns of U.S. history (Criterion A); or
- Be associated with the lives of significant persons in U.S. history (Criterion B); or
- Embody the distinctive characteristics of a type, period, or method of construction or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or
- Have yielded, or may likely yield, information important in prehistory or history (Criterion D).

3.11.6 Cultural Resources Investigation Within the MBPA

A Class I data review was conducted for MBPA at the State Historic Preservation Office (SHPO) on August 13, 2011. The objective of the existing data review was to conduct archival record searches of any previously documented cultural resource inventories or recorded archaeological sites within the MBPA. The Class I report stated that 255 previous cultural resource inventories were completed in the MBPA since 2000. The majority of the projects were conducted for oil and gas developments. Since 2005, most of the archaeological surveys were performed for Newfield Exploration Company. A total of 1,123 archaeological sites were previously documented in the MBPA. These sites include prehistoric (n=599), historic (n=468), and multicomponent (n=56).

3.11.6.1 Prehistoric Sites

Prehistoric cultural resources located in the MBPA were classified as one or more site types, including temporary camp, lithic scatter, rock art, habitation, and rock shelter. Camp sites typically contain evidence of temporary habitation in the form of domestic trash and the presence of features such as hearths, cists, and tent rings. Lithic scatters are often similar to camp sites but lack constructed features. Rock art refers to sites containing either petroglyphs or pictographs on cliffs or boulders. Habitation sites refer to sites occupied continuously or seasonally for extended periods of time. Habitation sites often contain features that required substantial investments of time or resources to construct, such as standing architecture or slab-lined storage sites. The distinguishing characteristic of a rockshelter is a natural alcove in a cliff or large boulder that was used by prehistoric inhabitants of the area. Some of these rockshelters may have served as camp or habitation sites. **Table 3.11.6.1-1** provides a list of the prehistoric sites that were identified during the Class I data review.

TABLE 3.11.6.1-1
CROSS TABULATION OF PREHISTORIC AFFILIATION AND SITE TYPE FOR THE MBPA

Site Type	Paleo-Indian	Paleo-Indian/ Archaic	Paleo-Indian/ Numic	Archaic	Archaic/ Fremont	Fremont	Fremont/ Numic	Numic	Unknown Aboriginal	TOTAL
Lithic Scatter	4	1	1	18	1	6		2	315	**348**
Temporary Camp	1	--	1	13	--	1	1	1	97	**115**
Quarry	--	--	--	1	--	--	--	--	62	**63**
Hearth	--	--	--	--	--	--	--	--	3	**3**
Cist	--	--	--	--	--	--	--	--	5	**5**
Rockshelter	--	--	--	2	--	5	--	--	37	**44**
Rock Art	--	--	--	--	1	1	--	--	5	**7**
Lithic-Ceramic Scatter	--	--	--	--	--	2	--	--	--	**2**
Ceramic Scatter	--	--	--	--	--	1	--	1	--	**2**
Fire-cracked Rock Concentration	--	--	--	--	--	--	--	--	2	**2**
Burial	--	--	--	--	--	--	--	1	--	**1**
Habitation	--	--	--	--	--	--	--	--	1	**1**
Structure	--	--	--	--	--	--	--	--	1	**1**
Rock Wall	--	--	--	--	--	--	--	--	1	**1**
Rock Alignment	--	--	--	--	--	--	--	--	2	**2**
Game Drive	--	--	--	--	--	--	--	--	1	**1**
Bison Remains	--	--	--	--	--	--	--	--	1	**1**
TOTAL	**5**	**1**	**2**	**34**	**2**	**16**	**1**	**5**	**533**	**599**

Source: MOAC 2011

3.11.6.2 Historic Sites

Historic sites of European-American affiliation represent the majority of the recorded cultural resources within the MBPA. The predominant site types are temporary camps (n=233) and trash scatters (n=118), followed by rock cairns (n=38) and mines or mining prospects (n=21). These common sites are classified under the historic themes of ranching/agricultural and Gilsonite mining in the Uinta Basin. Other European-American historic site types include inscriptions, corrals, canals, rock art, stock driveways hearths, a grave,

a road, a benchmark, and a Civilian Conservation Corps (CCC) dam. Since the MBPA borders the Uintah-Ouray Reservation, several Ute Indian affiliated sites have been documented, which consist of a rock art panel, a grave, and a rock shelter. **Table 3.11.6.2-1** provides a list of the historic sites that were identified during the Class I data review.

TABLE 3.11.6.2-1
CROSS TABULATION OF HISTORIC AND/OR UTE AFFILIATION AND SITE TYPE FOR THE MBPA

Site Type	European American	Ute Indian	European American Ute Indian	TOTAL
Temporary Camp	232	--	1	**233**
Trash Scatter	118	--	--	**118**
Cairn	38	--	--	**38**
Mine or Mining Prospect	21	--	--	**21**
Inscription	8	--	--	**8**
Corral	3	--	--	**3**
Canal	2	--	--	**2**
Rock Art	2	1	--	**3**
Stock Driveway	3	--	--	**3**
Grave	1	1	--	**2**
Hearth	2	--	--	**2**
Rockshelter	--	1	--	**1**
Road	1	--	--	**1**
Rock Alignment	1	--	--	**1**
Rock Concentration	1	--	--	**1**
Bench Marker	1	--	--	**1**
CCC Dam	1	--	--	**1**
Dual Site Function	27	--	1	**28**
TOTAL	**462**	**3**	**2**	**467**

Source: MOAC 2011

3.11.6.3 Multi-Component Sites

Multi-component sites consist of cultural resources with at least two distinct cultural affiliations or temporal periods and are spatially associated with one another. As applied here, multi-component sites consist of the same site types and cultural affiliations described above for prehistoric and historic sites. **Table 3.11.6.3-1** provides a list of the multi-component sites that were identified during the Class I data review.

TABLE 3.11.6.3-1
CROSS TABULATION OF MULTI-COMPONENT AFFILIATION
AND SITE TYPE FOR THE MBPA

Site Type	European American	Archaic	Fremont	Unknown Aboriginal	TOTAL
Prehistoric Lithic Scatter Historic Trash Scatter	yes	--	--	yes	**21**
Prehistoric Lithic Scatter Historic Temporary Camp	yes	--	--	yes	**12**
Prehistoric Lithic Scatter Historic Mining Prospect	yes	--	--	yes	**2**
Prehistoric Temporary Camp Historic Trash Scatter	yes	--	--	yes	**3**
Prehistoric Temporary Camp Historic Inscription	yes	--	--	yes	**2**
Prehistoric Lithic-Ceramic Scatter Historic Temporary Camp	yes	--	yes	--	**1**
Prehistoric Temporary Camp Historic Trash Scatter	yes	yes	yes	--	**1**
Prehistoric Groundstone Historic Rock Art or Graffiti	yes	--	--	yes	**2**
Prehistoric Quarry Historic Trash Scatter or Camp	yes	--	--	yes	**2**
Rockshelter	yes	--	--	yes	**1**
Prehistoric Rockshelter Historic Coyote Trap	yes	--	--	yes	**1**
Prehistoric Rockshelter Historic Trash Scatter	yes	--	--	yes	**1**
Prehistoric Rockshelter Historic Temporary Camp	yes	--	--	yes	**1**
Temporary Camp	yes	--	--	yes	**1**
Prehistoric Lithic Scatter Historic Cairn	yes	--	--	yes	**1**
Prehistoric Lithic Scatter Historic Corral	yes	--	--	yes	**2**

Site Type	European American	Archaic	Fremont	Unknown Aboriginal	TOTAL
Prehistoric Lithic Scatter Historic Well Location	yes	--	--	yes	**1**
Prehistoric Projectile Point Historic Temporary Camp	yes	--	--	yes	**1**
TOTAL	--	--	--	--	**56**

Source: MOAC 2011

3.11.6.4 NRHP Eligibility of Sites Identified Within the MBPA

A total of 363 prehistoric sites have been evaluated as eligible for the NRHP, as outlined in 36 CFR 60.4. Eligible prehistoric sites are dominated by lithic scatters (49 percent), followed by temporary camps (28 percent), and rockshelters (11 percent). The vast majority of the these prehistoric sites are deemed eligible to the NRHP, because they qualify for significance under Criterion D (have yielded, or may be likely to yield, information important in prehistory).

Thirty-six historic sites have been evaluated as eligible for the NRHP as outlined in 36 CFR 60.4. Eligible sites consist of temporary camps (n=15), mine or mining prospects (n=5), stock driveways, inscriptions (n=2), a trash scatter, a canal, rock art, and a grave. These sites are grouped under the historic themes of ranching/agriculture and Gilsonite mining. Qualifications for significance for these cultural resources are primarily based on Criterion A (strongly associated with historical events or patterns) and Criterion D.

A total of 30 multi-component sites have been evaluated as eligible for the NRHP, as outlined in 36 CFR 60.4. Eligible sites are dominated by prehistoric lithic scatters and historic trash scatters or temporary camps. . They qualify for significance under Criterion D, based on the importance the prehistoric components of the sites are likely to contribute to the prehistory of the area.

3.11.7 Summary of Cultural Resources

The Class I data review for the MBPA resulted in the identification of 255 previous cultural resource inventories and 1,123 archaeological sites within a 187-square-mile study area. These totals indicated a relatively moderate site density for the study area of nearly six sites per square mile. Approximately 97 percent of the MBPA has been previously block surveyed. As such, the results listed in **Tables 3.11.6.1-1, 3.11.6.2-1** and **3.11.6.3-1** may not be representative of the entire MBPA. Therefore, it is assumed that additional archaeological sites or artifacts (which are eligible for nomination on the NRHP) may exist in the MBPA, and site density may be higher than six sites per square mile.

3.12 LAND USE AND TRANSPORTATION

3.12.1 Land Use

As described in **Chapter 1.0**, approximately 87 percent of surface acres within the MBPA are managed by the BLM, about 11 percent are managed by the State of Utah, and the remaining acreage is under private or tribal ownership. The primary land uses within and adjacent to the MBPA include oil and gas development, livestock grazing, hunting, and dispersed recreation. For details regarding these specific land uses, refer to **Sections 3.8**, **3.9**, and **3.13**. Lands are developed for agricultural uses along the northern

boundary of the MBPA adjacent to Pariette Wash. Outside of this geographic area, minimal cropland is cultivated, given the predominance of dry desert shrubland that is typical of the Uinta Basin.

Road and utility rights of way (ROWs) are present within the MBPA, although their precise number and extent are not known. Many of the ROWs are related to well field activities. In addition, other roads exist within the MBPA, which are described in **Section 3.12.2** below. No commercial structures or private residences are built within the MBPA. The nearest residential community is Myton, Utah (population 550), which is located approximately 6 miles north of the MBPA's northern boundary.

3.12.2 Transportation

A network of Federal and State highways and county roads provide access to the MBPA. The Utah Department of Transportation (UDOT) monitors the use of Federal and State transportation corridors. As illustrated in **Figure 3.12.2-1 (Attachment 1)**, BLM, county, and operator-maintained roads provide access to leases, wells, and ancillary facilities within the MBPA.

3.12.2.1 Federal and State Highways

The road network of northeastern Utah is generally oriented to through-traffic and access between the dispersed, small population centers. Access to the MBPA is primarily from the north on U.S. 40/U.S. 191, which is a two-lane, all-weather highway in Utah's primary highway system. The highway is located approximately 6 miles north of the MBPA's northern boundary. U.S. 40/U.S. 191 extends east to Denver and west to Salt Lake City. It is the main east-west corridor for traffic from northern Colorado into Utah and serves as a route for tourist traffic to Dinosaur National Monument. U.S. 191 North also functions as a travelway for tourist traffic to Flaming Gorge National Recreation Area and other National Forest locations. U.S. 40/U.S. 191 provides access to the MBPA from the communities of Roosevelt, Duchesne, and Vernal, which would operate as the primary service centers for Project-related activity. No state highways or interstates exist to the south of the MBPA within 45 miles.

Traffic counts on U.S. 40/U.S. 191 can be fairly high, with higher traffic flows occurring during the summer tourist season. **Table 3.12.2.1-1** provides a summary of the average annual daily traffic (AADT) and percentage of the AADT associated with truck traffic on segments of U.S. 40/U.S. 191 that provide access to the MBPA. For 2011, the AADT counts along U.S. 40/U.S. 191 ranged from 5,435 vehicles per day near Duchesne to 27,205 vehicles per day in Vernal. In spite of increasing AADT counts, truck traffic showed a proportional decrease to the overall traffic on U.S. 40/U.S. 191 near the population centers of Duchesne and southern Roosevelt from 2005 to 2011. However, truck traffic on the stretch of highway serving Vernal increased from 19 percent to 37 percent from 2005 to 2011. All segments east of Roosevelt (U.S. 40/191 and 200 North Roosevelt) experienced increases in truck traffic during that same period. It should be noted that U.S. 40/U.S. 191 is used extensively by oil and gas field traffic.

Much of the traffic on these roads consists of oil tanker trucks that visit producing wells in the MBPA each day. These trucks travel approximately 140 miles one way to Salt Lake City, via U.S. 40 and Interstate 80. Additionally, production water tanker trucks as well as maintenance and passenger vehicles associated with oil and gas operational activities travel the MBPA roads each day. These vehicles generally travel locally to and from Vernal and Roosevelt.

TABLE 3.12.2.1-1
AADT AND PERCENT TRUCK TRAFFIC FOR U.S. 40/U.S. 191 SEGMENTS THAT PROVIDE ACCESS TO THE MBPA

Segment Name	2005 AADT	Percent Truck	2007 AADT	Percent Truck	2009 AADT	Percent Truck	2011 AADT	Percent Truck
22220 West Duchesne	5,205	37	5,660	37	5,555	40	5,900	34
State Route (SR) 87 Center Street Duchesne	4,995	40	7,190	40	7,270	40	7,770	31
East River Road Duchesne	5,060	42	5,030	42	5,085	40	5,435	28
12000 West Road to Bridgeland	5,455	44	5,490	43	5,730	46	5,865	25
Main Street Myton	5,550	46	6,570	46	6,640	45	7,545	22
B Street Myton	5,585	48	7,125	48	7,785	43	8,320	20
SR 87 Southwest of Roosevelt	8,390	13	10,370	20	9,220	20	8,340	16
2000 South Roosevelt	11,460	36	10,370	41	10,485	43	11,210	28
SR 121 SR 40 turns Right onto 200 North Roosevelt	10,010	34	14,895	39	15,055	44	16,090	35
Union Street Roosevelt	6,625	33	10,015	36	10,125	45	12,250	45
3500 East Ballard	6,130	31	7,580	36	7,660	39	9,395	41
7500 East Road to Fort Duchesne	5,835	24	7,290	24	7,365	33	8,090	39
SR 88 Road to Ouray	6,125	27	6,470	28	6,540	48	8,355	48
2500 West to Maeser	4,945	31	11,180	31	11,300	43	12,075	43
1500 West Vernal	21,345	35	22,235	34	21,540	39	20,940	39
SR 191 Vernal	27,735	19	28,895	19	27,990	37	27,205	37
500 South Vernal	13,240	22	13,585	27	13,330	34	14,085	34

AADT – average annual daily traffic
Source: UDOT (2005, 2007, 2009, 2011)

Crash statistics for Utah highways are available through the State Department of Highway Safety. **Table 3.12.2.1-2** provides a summary of crash statistics for both Duchesne and Uintah Counties from 2008 to 2010 – the most recent years for which data are available. Most of the vehicle crashes in both counties were property damage only (PDO) crashes. In Uintah County, the rate of fatal vehicle crashes has declined from 2008 to 2010. Fatal vehicle crash rates in Duchesne County have increased from 2008 to 2010. Injury vehicle crashes in both counties have generally decreased. When compared to statewide rates, injury

vehicle crash rates in both counties were lower from 2008 to 2010. However, fatal vehicle crash rates were generally higher in both counties than those in the state.

TABLE 3.12.2.1-2
CRASH HISTORY IN DUCHESNE AND UINTAH COUNTIES, 2008-2010

Year	County	PDO Crashes		Injury Crashes		Fatal Crashes		Total Crashes	
		Number	Rate*	Number	Rate*	Number	Rate*	Number	Rate*
2008	Duchesne	440	186.8	122	51.8	2	0.8	564	239.4
	Uintah	610	171.2	197	55.3	9	2.5	816	229.0
	State of Utah	38,997	150.7	17,125	66.2	245	0.9	56,367	217.8
2009	Duchesne	269	117.5	69	30.1	5	2.2	343	149.8
	Uintah	509	143.2	167	47.0	5	1.4	681	191.6
	State of Utah	35,398	135.0	15,752	60.1	217	0.8	51,367	195.9
2010	Duchesne	345	148.5	93	40.0	8	3.4	446	191.9
	Uintah	403	107.7	134	35.8	5	1.3	542	144.8
	State of Utah	34,155	128.3	14,995	56.3	218	0.8	49,368	185.5

PDO – property damage only
* Rate is per 100 million vehicle miles traveled
Source: Utah Department of Highway Safety 2008, 2009, 2010

3.12.2.2 County Roads

Because the MBPA encompasses portions of Duchesne and Uintah Counties, county roads serve as the primary access routes from U.S. 40/U.S. 191 into the MBPA. **Table 3.12.2.2-1** provides a summary of the main county roads within the MBPA. The three county roads that would provide access to the MBPA include Pariette Road in Duchesne and Uintah Counties, Wells Draw Road in Duchesne County, and Sand Wash Road in Duchesne County.

TABLE 3.12.2.2-1
COUNTY ROADS PROVIDING ACCESS TO AND WITHIN THE MBPA

County	Road Name	Length Within the MBPA (miles)	Road Surface	ROW Width (feet)
Duchesne	Wells Draw Road	9.5	Paved	26
Duchesne/ Uintah	Sand Wash Road	6.0	Unpaved	18
Duchesne	Pariette Road	6.8	Paved/unpaved	30

Pariette Road would be the primary access road to the MBPA, because it is the most direct route from U.S. 40/U.S. 191. Pariette Road intersects with U.S. 40/U.S. 191 just south of Myton, Utah, travels north/south into the MBPA, and eventually curves east. The road is paved from U.S. 40/U.S. 191 until it turns and traverses into Uintah County, where it becomes Pariette Bench Road, a Class 1-B Gravel Road, though portions of the gravel roadway have been recently paved.

Wells Draw Road is a road that traverses 9.5 miles through the western portion of the MBPA. Approximately 2.5 miles southwest of the community of Myton, Wells Draw Road branches off Pariette Road. Once the road leaves the MBPA, it extends southerly to Wrinkles Road, at which point it becomes Gate Canyon Road. Wells Draw Road has recently been paved and is one of the few stretches of paved road in the MBPA. It is anticipated that project traffic would only use the portion of Wells Draw Road that provides access to the proposed project within the MBPA; not the segment south of the MBPA that passes through BLM special designation areas and Special Recreation Management Areas (SRMAs). However, the primary access route to the MBPA would be through Pariette Road. Oil and gas trucks would travel to Vernal and Roosevelt to the north, where supporting road networks are adequate to carry trucks.

Sand Wash Road is also an important county road within the MBPA. It branches off Pariette Road approximately 5 miles from the northern border of the MBPA. Sand Wash Road runs in a generally southeasterly direction through the center of the MBPA for 6 miles, eventually ending at the Sandwash boat launch on the Green River.

In addition to the aforementioned county roads, numerous existing roads in the MBPA were built for farm and ranch access, recreation, oil and gas development, and mining. The majority of all county roads within the MBPA are unmaintained gravel roads and resource roads.

3.12.2.3 BLM System Roads

The majority of roads within the MBPA are part of the BLM transportation system. These roads include operator-maintained roads that service existing oil and gas development as well as BLM-maintained roads. Information on the extent and condition of the BLM roads within the MBPA is not available.

3.12.2.4 Right-of-Way and Road Maintenance Responsibility

As discussed in **Section 2.3.1.2**, the Proposed Action would require the construction or improvement of access roads to the proposed well sites. Approximately 363 miles of existing roads within the MBPA would require some level of ROW expansion and/or upgrades to accommodate increased oil and gas activity as well as to install pipeline and utility line corridors adjacent to the existing roads. In addition, approximately 243 miles of new access road would be constructed on BLM, state, and private surface lands.

A road network has been built incrementally within the MBPA to service ongoing oil and gas development. The BLM and oil and gas operators have developed this road network in conjunction with State and County road departments. UDOT currently maintains U.S. 40/U.S. 191. County Public Works Departments maintain several of the local roads in the MBPA vicinity, including the roads that are listed in **Table 3.12.2.2-1**. Well operators maintain roads that provide access to the MBPA well sites and facilities. Road maintenance on BLM roads are generally the responsibility of BLM.

3.12.2.5 Dust Control

As previously discussed, fugitive dust (which is created by traffic) is an issue on many of the primary transportation corridors in the MBPA. Current dust suppression techniques include the use of fresh water on BLM roads, as well as access roads to well pads within the MBPA. As discussed in **Section 2.2.8.2**, water would be used for dust suppression during the construction of well pads, associated access roads, and pipeline corridors. On county roads within the MBPA, magnesium chloride has been used occasionally in the past for dust control when drilling rigs are being moved or the traffic volumes are higher. The exception would be in areas located within the potential habitat polygon for *S. wetlandicus* and *S. brevispinus*.

3.13 RECREATION

Opportunities for recreation exist within the MBPA. The majority of the lands within the MBPA fall under the jurisdiction of the BLM VFO. However, public lands within Uintah and Duchesne Counties also provide diverse recreational activities. Recreational activities within the MBPA include boating, fishing on the Green River, cultural tourism, OHV use, hunting, sightseeing and wildlife viewing, hiking, and dispersed camping. Recreation activities also occur in the Pariette Wetlands and Lower Green River Corridor Areas of Critical Environmental Concern (ACECs), which are within or adjacent to the MBPA. **Section 3.15** discusses these areas in more detail.

3.13.1 Recreation Management

The primary goals and objectives for managing recreational resources on public lands are to ensure the continued availability of quality outdoor recreation opportunities and experiences that are not readily available from other sources. Based on its priorities for recreation and visitor services, the BLM has set forth three goals to which they are committed to following (BLM 2003b):

- GOAL 1 - Improve Access to Appropriate Recreation Opportunities on Department of the Interior (DOI) Managed or Partnered Lands and Waters.
- GOAL 2 - Ensure a Quality Experience and Enjoyment of Natural and Cultural Resources on DOI Managed or Partnered Lands and Waters.
- GOAL 3 - Provide for and Receive Fair Value in Recreation.

The BLM manages recreational use of public lands through two different basic units of recreation management: the SRMA and the Extensive Recreation Management Area (ERMA). An SRMA is an area where recreation is emphasized. SRMAs are defined as areas that require a recreation investment, where more intensive recreation management is needed and where recreation is a principal management objective (BLM 2005b). **Figure 3.13.1-1 (Attachment 1)** shows the SRMAs in the vicinity of the MBPA. No SRMAs exist within the MBPA. ERMAs are defined as areas where dispersed recreation is encouraged and where visitors have recreational freedom-of-choice with minimal regulatory constraints. They are usually areas that receive very little recreation use. These areas could include developed and primitive recreation sites with minimal facilities. Public recreation issues or management concerns are limited, and minimal management suffices in these areas.

Within an ERMA, recreation is generally unstructured and dispersed, requires minimal recreation-related investments, and has minimal regulatory constraints (BLM 2008b). Detailed planning is not usually required for these areas. All BLM areas that are not part of a SRMA are included within an ERMA. The MBPA is managed as an ERMA, and recreation is managed by recreation type rather than by specific type of experience and activity.

3.13.2 Recreation Use In ERMAs

Areas within the vicinity of the MBPA are managed as part of the Vernal ERMA for dispersed recreation uses that require minimal facility development. Within the MBPA, all BLM acres are managed as part of the ERMA. Roads of varying quality traverse the ERMA and provide access for a variety of uses, including oil and gas development and production, livestock grazing, and other public land uses. In addition, these roads provide access to recreation destinations such as the Green River.

Oil and gas development has left its mark on the land through well pads, pipelines, compressor stations, roads, and power lines. **Section 3.14** discusses existing visual resource conditions. Oil and gas drilling and production activities with associated truck traffic represent the majority of the noise disturbances in the vicinity of and within the MBPA. Noise levels are elevated near well pad and access road construction, drilling rigs, and along access roads. Both visual resource and noise impacts associated with oil and gas development would have impacts on recreational uses of the MBPA. However, while the landscape exhibits a presence of human development, it still retains some of its original basic character.

3.13.2.1 Recreation Types

The BLM manages various recreational opportunities and facilities on its lands. Examples of these opportunities and facilities include:

- Trails
- OHV recreation
- Hunting and wildlife viewing
- Scenic drives
- River recreation (including boating and swimming) on the Green and White Rivers
- Educational/cultural tourism
- Pariette Wetlands ecological field trips

The ERMA setting provides opportunities for a variety of motorized and non-motorized recreation activities. Motorized activities include backcountry driving and vehicle-supported camping, picnicking, fishing, wildlife viewing and sightseeing. Non-motorized activities include hiking, mountain biking, hunting, river floating, fishing, and wildlife viewing. No future new recreational sites are anticipated within the MBPA.

3.13.2.2 Off-Highway Vehicles

The BLM developed the 2001 *National Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands* (OHV Strategy) to assist field managers in the implementation of on-the-ground solutions for OHV recreation and access issues, to protect public land resources, and to make more efficient use of existing staff and funding. The OHV Strategy is an effort to manage motorized OHV activities in full compliance with EOs 11644 (1972) and 11989 (1978) and with 43 CFR 8340, which in part requires the BLM to assign designations to areas and trails to establish control over OHV use and operation. These designations are incorporated in the BLM 8340 Manual and are defined as follows:

- **Open:** The BLM designates areas as "open" for intensive OHV use where there are no compelling resources protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel.
- **Limited:** The agency designates areas as "limited" where it must restrict OHV use to meet specific resource management objectives. These limitations may include: restricting the number or types of vehicles; limiting the time or season of use; issuing permitted or licensed use only; limiting use to existing roads and trails; and limiting use to designated roads and trails. The BLM may place other limitations on use to protect resources, as needed. Limitations specifically apply in areas where motorized OHV enthusiasts ride intensely or participate in competitive events.
- **Closed:** The BLM designates areas as "closed" if closures to all vehicular use are necessary to protect resources, ensure visitor safety, or reduce use conflicts (BLM 2006d).

All of the BLM lands within the MBPA are designated as Limited for OHV use. OHV use in the MBPA is limited to designated travel routes. **Figure 3.13.2.2-1 (Attachment 1)** illustrates the OHV areas in the MBPA vicinity.

The use of OHVs around the MBPA will likely continue to increase as new trails are officially identified and the State of Utah continues to promote OHV recreation on public lands. According to the Utah Department of Motor Vehicles (UDMV), the number of statewide OHV registrations steadily increased from approximately 169,000 in 2004 (UDMV 2005) to more than 214,000 in 2007 (UDMV 2008). Starting in 2008, the number of statewide OHV registrations has been fluctuating with 187,781 current registrations in Utah (UDMV 2013). 2013 current OHV registrations total 4,995 in Uintah County and 2,809 in Duchesne County (UDMV 2013).

3.13.2.3 Hunting and Wildlife Viewing

Recreation uses within the MBPA are concentrated during the hunting seasons. The MBPA provides antelope as well as some mule deer and elk hunting opportunities. Pronghorn hunting in the area generally occurs during September, with the mule deer and elk hunting season taking place in October. The area also attracts some small game hunters who want to pursue rabbits and upland game birds.

Aside from big game and upland game hunting, low levels of waterfowl hunting also occur in and adjacent to the MBPA. On the opening weekend of waterfowl season, 10 to 35 hunters can be found at the Pariette Wetlands pursuing ducks and geese in and adjacent to the southeastern corner of the MBPA. On subsequent weekends throughout the season, hunters trickle onto the area (see **Section 3.13.2.5**). Waterfowl hunters are generally not found in any other parts of the MBPA. The Pariette Wetlands are also popular with bird watchers because a number of rare migrants are known to occur in the area.

3.13.2.4 River Recreation

Portions of the Green River are popular among river rafters, kayakers, and shore fishermen. The boating season on the Green River runs from approximately March 15 to November 15. Commercial outfitters typically run most of their trips between the Memorial Day and Labor Day holidays each year.

The 84-mile Desolation Canyon portion of the Green River begins at the Sand Wash put-in (boat launch), located approximately 9 miles south of the MBPA. Approximately 2 miles of the MBPA eastern boundary is adjacent to the Green River, upstream of the Sand Wash put-in. Though this stretch of river is occasionally used by boaters and fishermen, recreational use is not nearly as frequent as what occurs in Desolation Canyon below the Sand Wash put-in. Put-ins are located outside the MBPA; consequently, no put-ins exist within the Green River segment adjacent to the MBPA.

3.13.2.5 Wetland Recreation

The Pariette Wetlands ACEC is approximately 10,437 acres in size and is situated in the northeastern corner of the MBPA. This ACEC encompasses a portion of Pariette Draw, located approximately 24 miles southwest of Vernal, Utah (BLM 2008b, BLM 2012e). The Pariette Wetlands Complex comprises 9,033 acres within the ACEC; of these 9,033 acres, 2,529 acres are classified as wetland or riparian habitat. It is the largest BLM wetland area in Utah (BLM 2012e).

Prior to 1972, the perennial creek running through Pariette Draw fanned out near its confluence with the Green River into a small area of wetlands and riparian habitat. Recognizing an opportunity to increase

waterfowl production and seasonal habitat in the desert region of the Uinta Basin, BLM wildlife biologists dug a series of 23 gravity-fed ponds between 1972 and 1975 to create the wetlands (Utah Travel Industry 2012). To date, the completed Pariette Wetlands Complex supports more than 1,800 ducks and 100 geese during spring and fall migration each year, more than 100 documented species of birds, and numerous species of other wildlife such as deer, elk, bear, and mountain lion (Darren Williams, e-mail 2013).

The BLM manages Pariette Wetlands for waterfowl habitat and for recreational pursuits of hunting, bird watching and fishing. According to the BLM VFO, most visitors arrive on the opening weekend of waterfowl hunting season, at which time the wetland experiences approximately 60 to 70 visitor days and approximately 10 to 35 hunters during the waterfowl hunting season. Hunting activities decline substantially over the remainder of the season with an average of 5 to 10 hunters during other hunting seasons (Darren Williams, e-mail 2013). Approximately a dozen bird watchers visit the wetlands each spring; another dozen return to observe fall migration of shorebirds and waterfowl. The occasional group of deer and antelope hunters uses the uplands surrounding the Pariette Wetlands each year.

The BLM encourages visitation by providing directions to the site, road conditions, options for group tours, and hunting and fishing regulations. In total, an estimated 200+ people visit the site each year using the partially-graveled dirt roads leading from Fort Duchesne and Myton (Darren Williams, e-mail 2013).

3.13.2.6 Hiking

Hiking is infrequent within the MBPA, because relatively few attractions are available for hikers. However, the Pariette Wetlands ACEC contains an interpretive trail system available to hikers. The trail system winds through many of the ponds in the ACEC. Besides hiking, these trails also provide access for hunters, bird watchers, research professionals, schoolchildren, general recreationists, BLM employees, and volunteers.

3.13.2.7 Scenic Drives

Wells Draw Road traverses approximately 8 miles of the western portion of the MBPA and is classified as a State road (see **Figure 3.12.2-1 – Attachment 1**). Constructed in 1866 as a primary supply and communications line between Fort Duchesne and Price, this road offers numerous recreational opportunities, including driving, biking, hiking, and access to historic sites. The road is listed as both a State Scenic Byway and a County Scenic Road through the Wells Draw and Gate Canyon areas, as well as a BLM Back Country Byway. However, no specially designated sites are located along Wells Draw Road through the MBPA. One interpretive sign is presently located within the MBPA, in Section 5, Township 9 South, Range 16 East.

3.14 VISUAL RESOURCES

The BLM's current management objective for visual resources is to manage public lands in such a way as to preserve those scenic vistas deemed to be most important 1) in their impact on the quality of life for residents and communities in the areas, 2) in their contribution to the quality of recreational visitor experiences, and 3) in supporting the regional tourism industry and segments of the local economy that depend on public land resources. Another objective is to seek to complement the rural, agricultural, historic, and urban landscapes on adjoining private, state, and tribal surface lands by maintaining the integrity of background vistas on public lands (BLM 2008b).

3.14.1 General Visual Characteristics of the MBPA

The MBPA lies within the Uinta Basin of the Colorado Plateau Physiographic Province. The province is characterized by extensive vistas, plateaus, buttes, mesas, and deeply-incised canyons that expose flat-lying or gently warped strata. The general visual characteristics of the Uinta Basin topography west of the Green River can be described as relatively flat with wide, shallow valleys not more than a few hundred feet below the surrounding country (Stokes 1986). The landscape is composed of scenery that is typical of the central Uinta Basin: a predominance of shallow, gently rolling hills and drainages; shale-colored bluffs and steeply incised drainages in the vicinity of the Green River and Nine Mile Canyon; and distant views of the Uinta Mountains to the north, the Roan Cliffs and Book Cliffs to the south, and the Wasatch foothills to the west.

The MBPA is predominantly desert scrub and sagebrush, with numerous draws and canyons that may contain riparian bottomlands. The area appears vast and open before dropping off towards the Green River floodplain in the southeastern portion of the MBPA, where riparian vegetation blocks the far view. **Section 3.7** discusses resident vegetation in the MBPA in more detail. Views available from the MBPA include the Green River riparian area to the southeast and east, butte lands to the northeast, agricultural and semi-developed areas to the north, and desert scrublands to the south and west.

No human habitation is present within the MBPA. UDOGM oil and gas datasets estimate approximately 2,363 oil wells and 106 gas wells within the MBPA (Utah AGRC 2013). **Figure 2.3-1** shows active, inactive, and future UDOGM wells that occur within the MBPA boundary, including well status and well counts. The placement of oil and gas wells is most prevalent in the northern and central portion of the MBPA, with some well placement occurring in the southern portion. In the vicinity of the wells, access roads, pump jacks, storage tanks, and aboveground pipelines are a prominent part of the viewscape. The majority of the aboveground equipment at existing well sites is painted Desert Tan in color so as to better blend with the surrounding landscape. However, areas along the southern boundary of the MBPA and in the vicinity of the Green River are mostly undeveloped and exhibit a natural landscape.

3.14.2 Visual Resource Management System

The BLM is responsible for identifying and protecting scenic values on public lands under several provisions of NEPA and FLPMA. The Visual Resource Management (VRM) system was developed to ensure that visual resources on BLM-managed lands are inventoried and protected in a systematic, interdisciplinary manner. The VRM system provides a methodology to inventory existing scenic quality; to assign visual resource inventory classes based on a combination of scenic values, visual sensitivity, and view distances; and to assign visual management objectives. The VRM system also includes a contrast rating procedure for evaluating the potential visual consequences of a proposed project or management activity. It provides a basic approach for evaluating direct visual impacts and potential cumulative visual impacts of the proposed project.

The VRM system has established four visual resource classes that serve not only as an inventory tool that represents the relative value of existing visual resources, but also as a management tool that defines visual management objectives for the respective classified lands. A VRM class is based on the physical and sociological characteristics of a given homogenous area and serves as a visual management standard. **Table 3.14.2-1** describes the VRM classes and their objectives.

TABLE 3.14.2-1
VRM CLASSES AND OBJECTIVES

VRM Class	Objective
I	To preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
III	To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	To provide for management activities that require major modification to the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 2008b

3.14.3 Visual Resource Management in the MBPA

The BLM VFO has visually inventoried and applied the VRM system to all public lands under its jurisdiction within the MBPA, with the overall objective being to minimize impacts to visual resources resulting from human activities. The Vernal Field Office Resource Management Plan (RMP) has designated areas within the MBPA as VRM Class II-IV. **Figure 3.14.3-1 (Attachment 1)** shows the VRM classes within the MBPA. Existing and proposed oil and gas development occurs within each of these designations. **Table 3.14.3-1** summarizes the acreage for each VRM class within the MBPA.

TABLE 3.14.3-1
ACREAGE WITHIN THE MBPA BY VRM CLASS

VRM Class	Acreage
Class I	0
Class II	386
Class III	20,837
Class IV	82,662
Total	**103,885**

Approximately 79.6 percent of the BLM lands within the MBPA is designated as VRM Class IV, which allows major modifications to the existing character of the landscape. The Pariette Wetlands area in the northeastern portion of the MBPA and the Wells Draw Road corridor in the western portion of the MBPA are designated as VRM Class III. The level of change to the characteristic landscape for Class III should be moderate. The Green River Corridor, which lies in the southeastern portion of the MBPA, is designated as VRM Class II, where the level of change to the characteristic landscape should be low.

Visual sensitivity generally is a function of the number of people that will view the landscape, the duration of their views, their proximity to the landscape, and the reason they are in a position to observe the views. There are visitors that are drawn to portions of the MBPA that may be considered visually pleasing. Public views of the MBPA would be from public travel routes and recreational use areas within the vicinity. Visually sensitive portions of the MBPA include those areas that are visible from the Pariette Wetlands overlook, approximately 0.5 mile east of the MBPA, and the Green River Corridor, adjacent to the southeastern portion of the MBPA.

Existing land uses within the MBPA that could potentially cause visual intrusions and have an impact on scenic quality include surface-disturbing activities such as oil and natural gas exploration and development, OHV use, trail and/or road development, livestock grazing and rangeland management activities, and agricultural operations. Oil and gas wells are present throughout the northern and central portion of the MBPA. Agricultural operations are located along the northern boundary of the MBPA, near Pariette Draw. Most road development in the MBPA is associated with oil and gas well installations.

3.14.4 Visual Resource Inventory

The following description of the BLM's 2011 Visual Resource Inventory (VRI) process was taken from Logan Simpson Design (2011). The VRI process establishes VRI classes, which are used to assess visual values for resource management plans (RMPs). Visual management objectives are developed through the BLM's resource management planning process and reflect the resource-allocation decisions made in the RMP. According to BLM Manual H-1601-1, Land Use Planning, implementation decisions must be designed to achieve VRM objectives within each VRM class (BLM 2005c). VRM classes may reflect VRI classes, but they may not necessarily do so since management objectives for other resources as determined in the planning process may require different visual management needs. The inventories serve as the baseline information for assessing potential effects to visual resources of by proposed projects. The BLM's VRM system was used to inventory and classify the scenic (visual) resources for the analysis area. The inventory identified the scenic quality, sensitivity levels, and distance zones, and then determined VRI classes in accordance withthe VRM manual for use as baseline information for describing impacts to the visual landscape.

BLM defines scenic quality as the measure of the visual appeal of the landscape. The VRI process is based on the assumption that, while all lands have some level of scenic value, the areas with the greatest variety and most harmonious composition have the greatest scenic value. Although scenic quality is evaluated in relation to the natural landscape, this does not mean that human-made features necessarily detract from the scenic value of a landscape. In fact, human-made features may actually enhance the scenic value.

In the inventory process, the landscape is divided into areas that have generally similar characteristics based on the key factors, especially the landform, vegetation and sometimes water. These areas are called Scenic Quality Rating Units (SQRU). Each unit is subsequently described in terms of its landscape character elements of form, line color, and texture and evaluated for all seven key factors. The factors are scored according to a scale of 1 to 5 for most factors, although a Cultural Modifications factor can have a negative impact on the SQRU.

The Scenic Quality Rating is the result of totaling the scores of the seven analysis factors on the Scenic Quality Field Inventory (SQFI) rating form and assigning the rating based on points according to the following schedule:

- Class A = a score of 19 points or more

- Class B = a score of 12 to 18 points
- Class C = a score of 11 points or less

The scenic quality field inventory was conducted in June 2011. The process began with an inventory team meeting, which included a group of approximately 6-8 interdisciplinary staff members from the BLM's VFO. The meeting began with a review of the VRI process as described in Manual H-8410-1, after which inventory observation points (IOPs) and travel plans were discussed. In the process of planning IOPs and travel routes, SQRU boundaries were revised in some areas based on discussions with BLM staff most familiar with each area.

BLM staff planned the preliminary locations of IOPs using both BLM Surface Management Status topographic maps and the SQRU field maps. While a variety of factors, including traffic volume, accessibility, and logistical viewpoint locations were considered, the IOPs were primarily selected based on providing a good location to capture a view of the characteristic landscape of the SQRUs. The IOPs were marked on the maps and travel routes to each of the points were then highlighted.

An in-field calibration exercises performed in which the teams collectively evaluated a selected SQRU to ensure that the inventory teams would be using similar criteria and terminology to evaluate the landscape in their respective inventory areas. Together, they filled out an example rating form and discussed the intricacies of the inventory system and form. They discussed key terms from the BLM's list of suggested vocabulary and then determined, to the extent possible, the terms that would be most relevant to the physiographic provinces.

The inventory teams then split into their planned areas and traveled their planned routes throughout theVFO area. Each team was joined by at least one representative from the BLM VFO. IOPs for the units were primarily determined as the team traveled through the units and depended on where the best viewing area could be photographed, although some viewpoints had been predetermined by the field office staff. Each team recorded the views from the IOPs with a GPS-enabled digital camera, which recorded geographical locations (latitude and longitude) for each photo.

During in-field inventory of each SQRU, the teams reviewed the preliminary delineations and sketched, as necessary, proposed changes to the boundaries on the field maps. The field revisions resulted in a total of 83 SQRUs, as the preliminary units were split and/or combined along with the boundary adjustments. The MBPA occurs in the Pariette Bench and Castle Peak Pinnacle Units. The teams also completed BLM SQFI rating forms (Form 8400-1, BLM Manual H-8410-1) for each SQRU In the first step of evaluating each SQRU, landscape character was defined in terms of form, line, color, and texture, as described below and as exemplified in Illustrations 4, 5, 6, and 7 in BLM Manual H-8410-1:

- Form: The mass or shape of an object, or of objects that appear unified.
- Line: The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture or when objects are aligned in a one-dimensional sequence. Usually evident as the edge of shapes or masses in the landscape.
- Color: The property of reflecting light of a particular intensity and wavelength (or mixture of wavelengths) to which the eye is sensitive. It is the major visual property of surfaces.
- Texture: The aggregation of small forms or color mixtures into a continuous surface pattern; the aggregated parts are enough that they do not appear as discrete objects in the composition of a scene.

The second step included identifying general comments about the character, land use or other aspects of the SQRU in the narrative section of the field inventory form. To gain a better perspective of the overall character of each SQRU, the SQRUs were later reviewed using GIS programs. Additional notes from this review were added to the inventory forms, and all notes were then summarized for the geodatabase in paragraph form.

In the final step, scores were recorded for each of the seven key factors of the landscape within the SQRU according to the scale for each factor as described in the Scenic Quality Inventory and Evaluation Chart. The scores were then totaled, and a scenic quality classification of A, B, or C was determined using the numeric scale on the SQFI rating form. A Scenic Quality Rating of A indicates high scenic quality (Logan Simpson Design 2011). The Pariette Bench Unit and Castle Peak Units received Scenic Quality Ratings of C, which indicates lower scenic quality.

3.15 SPECIAL DESIGNATIONS

Special management areas are congressionally and administratively designated areas that include ACECs and WSRs.

3.15.1 ACECs

An ACEC is defined in FLPMA as a designation that highlights areas where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, and scenic values; fish and wildlife resources or other natural systems or processes; or to protect human life and safety from natural hazards. BLM establishes special management measures for these areas through land use planning. The designation is a record of relevant and important values that must be accommodated when BLM considers future management actions and land use proposals (BLM 2012d). ACECs differ from other special designations in that the designation by itself does not automatically prohibit or restrict other uses in the area. The management of ACECs is focused on the resource or natural hazard of concern and varies considerably from area to area.

To be considered for designation as an ACEC, an area must meet the requirements of relevance and importance as described in the Code of Federal Regulations (43 CFR 1610.7.2). The definitions for relevance and importance are as follows:

Relevance: An area is considered relevant if it contains one or more of the following:

- A significant historic, cultural, or scenic value (for example rare or sensitive archaeological resources and religious or cultural resources important to Native Americans).
- A fish or wildlife resource (for example habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).
- A natural process or system (for example endangered, sensitive, or threatened plant species; rare, endemic, or relict plants or plant communities; rare geologic features).
- A natural hazard (for example areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the RMP process that it has become part of the natural process.

Importance: The value, resource, system, process, or hazard described above must have substantial significance to satisfy the importance criteria. This generally means it is characterized by one or more of the following:

- Has more than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
- Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.
- Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare.
- Poses a significant threat to human life and safety or to property.

The Vernal RMP states that areas are to be designated and managed as ACECs where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural system or processes, or to protect life and safety from natural hazards (BLM 2008b).

The MBPA encompasses the Pariette Wetlands ACEC and is partially within the Lower Green River Corridor ACEC. **Figure 3.15-1 (Attachment 1)** indicates the location of these two ACECs. The management decisions for the ACECs are listed in the Vernal RMP (BLM 2008b).

3.15.1.1 Pariette Wetlands ACEC

The total size of the Pariette Wetlands ACEC is approximately 10,437 acres (see **Section 3.13.2.5**). It is comprised of a wetland ecosystem that contains approximately 980 acres of riparian habitat, 516 acres of ponds that provide open-water waterfowl habitat, and 1,033 acres of other wetland habitat. The ACEC contains special status bird and plant species, including a considerable population of the federally listed threatened plant species Pariette cactus (*S. brevispinus*) and Uinta Basin hookless cactus (*S. wetlandicus*). The presence of special status bird and plant habitat and of the wetlands ecosystem meets the relevance and importance criteria of ACECs, per Appendix G of the Vernal RMP. State and private lands are not managed as ACEC lands.

Approximately 7,216 acres of the ACEC are within the Core Conservation Areas of the Uinta Basin hookless cactus, and 333 acres are within the Core Conservation Areas of the Pariette cactus. The purpose of the proposed Core Conservation Areas and management recommendations is to protect the most important populations or sub-populations, and reduce threats to both *Sclerocactus* species. Two levels of Core Conservation Areas were developed based on pollinator travel distance and habitat connectivity between populations and individuals. **Section 3.10.1.2.1** discusses the management areas for both *Sclerocactus* species.

According to the Vernal RMP, the primary management objective for the Pariette Wetlands ACEC is to protect the relevant and important special status bird and plant habitat as well as wetlands ecosystem values, waterfowl production, and soil (BLM 2008b). The BLM's management decisions for the ACEC emphasize seasonal and surface occupancy restrictions for protection of wildlife and plant species, protection of floodplains and erosive soils, and the management of vegetation to benefit riparian and watershed values. The management decision for the Pariette Wetlands ACEC is found in Section E of the Vernal RMP (BLM 2008b).

The Pariette Wetlands ACEC was designated after the majority of its land area had been leased for oil and gas development. Consequently, 36 producing oil and gas wells with associated access roads and utilities

are currently present within the boundary of the ACEC (Utah AGRC 2013). Of the 36 producing wells that are currently present within the boundary of the ACEC, 35 fall within the "Existing Development" vegetation community and one falls within "Agricultural Lands" vegetation community.

Under Management Decision ACEC-11 of the Vernal RMP, Pariette Wetlands will continue to be designated as an ACEC. A comprehensive integrated activity plan will be developed/implemented that will address protection of special status bird and plant species and habitat, wetlands ecosystem, waterfowl production, and soil (To date, this plan has yet to be finalized). OHV use will be limited to designated routes. Visual resources will be managed as Class III. For oil and gas leasing within Pariette Wetlands ACEC:

- Zero acres will be open to leasing subject to the terms and conditions of the standard lease form.
- Zero acres will be open to leasing subject to moderate constraints such as timing limitations and Controlled Surface Use.
- About 10,437 acres will be open to leasing subject to major constraints such as No Surface Occupancy (NSO) stipulations.

It should be noted that the project applicant holds oil and gas leases within the Pariette Wetlands ACEC that predate the ACEC designation. These leases are valid existing lease rights, and as such development is allowed on the leased areas.

3.15.1.2 Lower Green River Corridor ACEC

The Lower Green River Corridor ACEC encompasses approximately 238 acres of the MBPA that are adjacent to the Green River. The total size of the ACEC is approximately 8,470 acres (BLM 2008b). It contains significant riparian habitat, special status plant, fish, wildlife species habitat, and high-quality scenic values. The riparian habitat and scenic values meet the relevance and importance criteria, per Appendix G of the Vernal RMP. The ACEC contains approximately 1,338 acres of riparian habitat. It encompasses 8,207 acres within the USFWS potential habitat polygon of the Uinta Basin hookless cactus, and 662 acres within 0.5 mile of known raptor nests. Approximately 30 miles of the Green River with wild and scenic qualities overlap with the Lower Green River Corridor ACEC (see **Section 3.15.3** below).

According to the Vernal RMP, the primary management objective for the Lower Green River Corridor ACEC is to protect relevant and important riparian habitat and scenic values (BLM 2008b). The ACEC management decisions for the area emphasize the protection of riparian and special status species through seasonal and surface occupancy restrictions and the protection of the Green River viewshed VRM II. The management decisions for the Lower Green River Corridor ACEC can be found in Section E of the Vernal RMP (BLM 2008b). The 2008 Vernal RMP restricts surface occupancy for leasable materials on all acres of the Lower Green River Corridor ACEC to protect the listed management objectives for the ACEC.

Under Management Decision ACEC-6 of the Vernal RMP, the Lower Green River Corridor will continue to be designated as an ACEC. Within line of sight or up to one-half mile from the centerline of the river, whichever is less, NSO stipulations will apply. OHV use will be limited to designated routes. Visual resources will be managed as Class II. For oil and gas leasing within the Lower Green River Corridor ACEC:

- Zero acres will be open to leasing subject to the terms and conditions of the standard lease form.
- Zero acres will be open to leasing subject to moderate constraints such as TLs and CSU.

- Approximately 8,470 acres will be open to leasing subject to major constraints such as NSO stipulations.
- Zero acres will be unavailable for leasing.

3.15.2 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-524) is designed to preserve free-flowing rivers with outstandingly remarkable values (ORVs) in their natural condition for the benefit of present and future generations, balancing the nation's water resource development policies with river conservation and recreational goals. The evaluation of rivers for potential designation into the National Wild and Scenic Rivers System (NWSRS) is a three-step process: 1) determine the river's eligibility, 2) assign a tentative classification, and 3) determine suitability for final designation. Rivers can be designated into the national system by an act of Congress or by the Secretary of the Interior at the request of a State governor.

To be eligible, a river must be free flowing. The Wild and Scenic Rivers Act defines "free-flowing" as any river or section of river, existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, with shorelines or watersheds still largely primitive and shorelines largely undeveloped. However, minor structures existing at the time any river is proposed for inclusion in the NWSRS will not automatically bar its consideration from such inclusion, provided that it will not be construed to authorize, intend, or encourage future construction of such structures within components of the NWSRS.

Another screening criterion to determine if a river segment may be eligible for inclusion in the NWSRS is that the river must possess at least one ORV. An ORV is a unique, rare, or exemplary feature of a river that is significant at a comparative regional or national level. The value may be scenic, recreational, geological, fish-related, wildlife-related, historic, cultural, botanical, hydrological, paleontological, scientific or other value (BLM 2008c). For the Lower Green River, recreational use and fish habitat are the ORVs, as identified in Appendix G of the Vernal RMP.

The MBPA borders a segment of the Green River that BLM has proposed for Wild and Scenic River (WSR) designation. **Figure 3.15-1** indicates the location of the proposed WSR area. The management decisions for the Green River segment are listed in the Vernal ROD and Approved RMP (BLM 2008b). Under Management Decision WSR-1, the BLM will continue to manage previously recommended segments of the Upper Green and Lower Green Rivers to protect their outstandingly remarkable values and the tentative scenic classification until such time that a designation decision is made.

3.15.3 Suitable Lower Green River Wild and Scenic River

The total size of the Lower Green River WSR area is approximately 11,968 acres. The Vernal RMP carried forward the Lower Green River along the eastern boundary of the MBPA as suitable for inclusion in the NWSRS, with a tentative classification as "Scenic" (BLM 2008b). The BLM currently manages about 27 miles of shoreline out of a total of 30 shoreline miles along the river. The Lower Green River WSR encompasses approximately 286.5 acres of the extreme southeastern portion of the MBPA.

The BLM is required to manage the Lower Green River as suitable WSR to protect its free-flowing nature, ORVs, and tentative classification within a corridor measuring 0.25 mile from the high water mark on each side of the river bank. The Lower Green River would be managed to protect recreational use and fish habitat, which are the outstanding remarkable values identified in the Vernal RMP. The Vernal RMP places an NSO stipulation on areas within 0.5 mile or line of sight of the centerline of the river, whichever is less.

3.16 SOCIOECONOMICS

The primary geographic areas of analysis to evaluate the potential socioeconomic effects of the proposed project are Duchesne County, Uintah County, and the State of Utah. This section characterizes the socioeconomic conditions of the economy and population, housing resources, community services, and selected local and State revenues. This section also describes socioeconomic conditions of the Northern Ute Indian Tribe, whose reservation is adjacent to the MBPA.

3.16.1 Population, Housing, and Demographics

The Demographic and Economic Analysis (DEA) section of the Utah Governor's Office of Planning and Budget (UGOPB)is responsible for managing, analyzing, and disseminating economic, demographic, and fiscal data. The DEA not only estimates population levels and characteristics but also projects long-term economic and demographic trends.

Table 3.16.1-1 provides population data for the two counties within the MBPA, along with the State of Utah and U.S. population data. Overall, population in the two-county region increased from a combined population of 39,694 in 2000 to 51,195 in 2010, which represents an increase of approximately 29 percent. According to the Utah Population Estimates Committee, the population growth rate for Duchesne County from 2008 to 2009 was 3.6 percent – the highest growth rate among Utah counties. The growth rate for Uintah County during the same period was 2.8 percent, the fourth highest rate in the state. By comparison, the population growth rate for the State of Utah from 2008 to 2009 was 1.5 percent (UGOPB 2009). Growth in Duchesne and Uintah counties can be primarily attributed to the natural resources and mining industry, which includes oil and gas extraction, metal mines, coal mines, sand and gravel, and non-metal mines.

In terms of racial composition, approximately 89.2 percent of the Duchesne County population is white and 4.5 percent is American Indian/Alaska Native. Nearly 6.0 percent of the population in Duchesne County is Hispanic, an ethnicity that covers several racial categories. In Uintah County, approximately 86.6 percent of its population is white, and 7.7 percent is American Indian/Alaska Native. About 7.1 percent of the population in Uintah County is Hispanic (U.S. Census Bureau 2010).

TABLE 3.16.1-1
POPULATION DATA

Location	Population[1]		Change in Population 2000-2010	Projected Population[2]	
	2000	2010		2020	2030
Uintah County	25,297	32,588	+29.2%	37,950	40,638
Duchesne County	14,397	18,607	+29.5%	20,130	21,533
State of Utah	2,246,553	2,763,885	+23.8%	3,652,547	4,387,831
United States	281,421,906	308,745,538	+9.7%	341,387,000	373,504,000

[1] U.S. Census Bureau 2010
[2] UGOPB 2008, U.S. Census Bureau 2008

Table 3.16.1-2 summarizes key demographic statistics. In 2010, an estimated 18,349 housing units were available for use by residents in the two counties, and 21,332 persons were employed in the labor force. A

key statistic presented in this table is the Employment/Housing Ratio, more commonly known as the "jobs-housing balance." The balance between jobs and housing is the relationship between the number of people employed in an area versus the potential housing opportunities that currently exist in that same area. A common target for the jobs-housing balance ratio is 1.5 employees for every housing unit, with a recommended range from 1.3 to 1.7 employees per housing unit (Weitz 2003). A ratio above this range indicates that there are more jobs than available housing, which implies that employees are commuting from outside the area into the community for work. Conversely, a ratio below this range indicates that there is more housing than available jobs, which may show that employees are commuting from the community to outside employment. In both situations, additional traffic would be generated along with its associated environmental impacts. Based on information from the U.S. Census Bureau, the ratio of employees to the potential housing opportunities in Uintah and Duchesne Counties were 1.16 employees for every housing unit in 2010.

TABLE 3.16.1-2
DEMOGRAPHIC CHARACTERISTICS OF THE MBPA, 2010

County	Housing Units[1]	Employment[2]	Individuals per Household[1]	Employment/ Housing Ratio
Uintah County	11,659	14,091	3.07	1.21
Duchesne County	6,690	7,241	3.05	1.08
Total	**18,349**	**21,332**	**-**	**1.16**

[1] U.S. Census Bureau 2010. Housing units for seasonal, recreational, or occasional are excluded.
[2] U.S. Census Bureau 2011. Includes employed persons 16 years of age and older.

3.16.2 Employment and Income

Table 3.16.2-1 provides a breakdown of non-agricultural job sources in Duchesne and Uintah Counties by employment sector. The economies of both counties are largely based on natural resources and mining. Other industries that bring revenue into these counties include trade, transportation, utilities and government.

TABLE 3.16.2-1
NON-AGRICULTURAL JOB SOURCES IN DUCHESNE AND UINTAH COUNTIES BY EMPLOYMENT SECTOR, 2010

Employment Sector	Duchesne County		Uintah County	
	Jobs	% Total	Jobs	% Total
Natural Resources and Mining	1,510	20.6	2,627	19.8
Construction	523	7.1	957	7.2
Manufacturing	170	2.3	166	1.3
Trade, Transportation, and Utilities	1,707	23.3	3,031	22.8
Information Services	193	2.6	136	1.0

Employment Sector	Duchesne County		Uintah County	
	Jobs	% Total	Jobs	% Total
Financial Activity	177	2.4	537	4.0
Professional and Business	206	2.8	684	5.2
Education and Health	349	4.8	966	7.3
Leisure and Hospitality	374	5.1	976	7.3
Other Services	184	2.5	365	2.7
Government	1,938	26.4	2,835	21.3
Total	**7,331**	**100.0**	**13,280**	**100.0**

Percentages may not total 100 percent due to rounding.
Source: UGOPB 2011.

Data from the Utah Department of Workforce Services (UDWS) show that the 2011 unemployment rate was 5.5 percent in Duchesne County and 5.1 percent in Uintah County. Both rates were below the statewide rate of 6.7 percent. In 2011, Duchesne County gained 684 positions, while Uintah County gained 909 positions. Employment levels in Utah fell between 2008 and 2010, but increased in 2011 (UDWS 2011). The state unemployment rate began falling in late 2010, and that pattern continued through 2011. Unemployment is expected to continue falling through 2013, with the unemployment rate projected to decline to 5.9 percent. Employment in Utah is projected to grow 3.2 percent during 2013, as compared to 1.3 percent for the U.S. (UGOPB 2012).

After a 2-year hiatus, the Uinta Basin (which includes Duchesne and Uintah Counties) has seen a 2 percent decrease in the unemployment rate (Shelly Ivie, Assistant Director, UDWS, pers. comm.). According to UDWS data, the region's average unemployment rates in 2009 and 2010 were above the state average but below the national average. That changed in 2011, when the unemployment rate for Duchesne County fell to 5.9 percent and Uintah County's fell to 5.4 percent. By comparison, the state unemployment rate average for 2011 was 7.1 percent, and the national average was 8.9 percent. In December 2011, Utah's economy added 6,052 jobs over the same month in the prior year. More than 1,700 of these jobs – approximately 28 percent of the total – occurred in Duchesne and Uintah Counties (Deseret News, March 7, 2012).

In 2010, per capita income was $21,787 in Duchesne County and $24,160 in Uintah County. Both figures were close to the State of Utah average of $23,139 and lower than the national average of $38,564. Utah is unique when comparing personal income and median household income to other parts of the country. Although Utah has a very low per capita personal income, the state's median household income is ranked tenth highest in the nation. This is due to the fact that Utah has the largest household size in the nation, and per capita figures are diluted by a larger number of children. As such, median household figures provide a more accurate measure of family income. In 2010, Utah's median household income of $56,330 was 108 percent of the national average of $51,914 (U.S. Census Bureau 2011). Although no median household income statistics are available for Duchesne and Uintah Counties, based on the information presented above, it can be assumed that the median household income is comparable to the national average.

Due to the level of oil and gas development taking place within the Uinta Basin, the average per capita income in Duchesne and Uintah Counties has steadily increased in recent years. Between 2006 and 2010, per capita incomes for both counties increased by about 10 percent annually (U.S. Census Bureau 2011).

Table 3.16.2-2 shows non-agricultural payroll wages in Duchesne and Uintah Counties by employment sector, with state wages included for comparison. When comparing **Tables 3.16.2-1** and **3.16.2-2**, it is apparent that payroll from natural resources and mining comprises a high percentage of the total wages in Duchesne and Uintah Counties, relative to the total employment within the sector. Wages from this sector account for a much larger percentage of total non-agricultural payroll wages in both counties than it does for the State of Utah as a whole.

TABLE 3.16.2-2
NON-AGRICULTURAL PAYROLL WAGES BY EMPLOYMENT SECTOR, 2010

Employment Sector	Duchesne County		Uintah County		State of Utah	
	Wages (millions)	% of Total	Wages (millions)	% of Total	Wages (millions)	% of Total
Natural Resources and Mining	104.9	34.5	172.2	30.8	736.3	1.6
Construction	23.3	7.7	44.9	8.0	2,745.3	6.0
Manufacturing	7.0	2.3	5.3	0.9	5,475.9	11.9
Trade, Transportation, and Utilities	64.8	21.3	126.2	22.6	8,127.5	17.7
Information Services	7.4	2.4	4.5	0.8	1,498.9	3.3
Financial Activity	5.7	1.9	26.7	4.8	3,380.1	7.4
Professional and Business	8.9	2.9	27.0	4.8	7,136.1	15.6
Education and Health	11.3	3.7	27.6	4.9	5,431.7	11.8
Leisure and Hospitality	4.2	1.4	12.5	2.2	1,759.9	3.8
Other Services	6.9	2.3	11.7	2.1	951.0	2.1
Government	59.4	19.6	100.9	18.0	8,633.6	18.8
Total	**303.8**	**100.0**	**559.5**	**100.0**	**45,876.2**	**100.0**

Percentages may not total 100 percent due to rounding.
Source: UGOPB 2011.

3.16.3 Taxes and Revenues

Oil and gas operations contribute considerable revenue to various federal, state, and local governmental entities through payment of various royalties and taxes. Revenue types and amounts that are received by the Ute Indian Tribe are confidential, and therefore are not disclosed in this document. The types of revenue that oil and gas development typically generates is discussed below.

3.16.3.1 Federal Mineral Lease Royalties

Federal mineral lease royalties are collected from oil and gas, gas plant products, Gilsonite, and phosphate extraction operations that are located on federally-held mineral deposits. At present, the federal royalty rate is approximately 12.5 percent of the total production rate. Typically, federal mineral leasing regulations require that 50 percent of gross revenues collected from mineral lease royalties be returned to the state of origin. The BLM subtracts a management fee for disbursing funds and currently sequesters an additional 5.1 percent. The actual royalties returned to the State of Utah are approximately 43 percent.

3.16.3.2 State Mineral Lease Royalties

Similar to Federal mineral royalties, the State of Utah receives mineral lease royalties at a rate of approximately 12.5 percent for all oil and gas development on State lands. SITLA manages all state lands within the MBPA. As an independent agency, SITLA manages lands that were granted to the State of Utah by the United States predominantly for the purpose of supporting public schools and academic institutions. Oil and gas royalties are the largest source of trust land revenue within the State of Utah.

3.16.3.3 Sales and Use Tax Revenue

Oil and gas operators pay sales taxes when they purchase equipment, materials, or supplies in the local area. Examples of purchases that generate sales tax revenue include gravel, pipe, fuel, and other supplies purchased locally. Like property tax revenue, local cities and counties use sales and use tax revenues to fund a wide variety of important local services and community facilities. As of April 1, 2012, the Utah sales and use tax rate was 4.70 percent. In addition to the State sales tax, all counties, cities, and towns are entitled to impose an additional 1 percent local sales tax. Counties may also impose an "option sales tax" of 0.25 percent. Duchesne County imposes all 3 sales taxes for a combined rate of 5.95 percent. Uintah County imposes these same three 3 sales taxes combined with a "cultural, botanical and zoo" sales tax of 0.1 percent, for a combined rate of 6.05 percent (Utah State Tax Commission 2012a).

3.16.3.4 Severance Tax

The State of Utah levies severance tax on oil and gas that is produced, saved, sold, or transported from the field where it was produced. These taxes are paid on crude oil, condensate, unprocessed gas, residue gas, and natural gas liquids. Currently, severance taxes are collected at a split rate. The first $13.00 per barrel of oil is taxed at a rate of 3 percent, and the amount above $13.00 is taxed at 5 percent.

Oil and mining severance tax is one of Utah's eight major tax revenue sources, which also include taxes on sales and use, income, corporate franchises, insurance premiums, beer, cigarettes, and tobacco. In fiscal year 2011, the State of Utah collected $59,855,286 in severance tax (Utah State Tax Commission 2012b). Severance taxes are paid to the Utah State Tax Commission and deposited into the State's general tax fund. Because taxes are paid directly to the State of Utah, collection information is not available on a per county basis.

3.16.3.5 Conservation Tax

The Utah State Tax Commission collects a conservation tax at a rate of 0.2 percent of the value of oil, gas, and natural gas liquids that are produced, saved, and sold, or transported from the production site of a well. It applies to all interest owners in the well. Revenue generated from the conservation tax is paid to the State Tax Commission and deposited into the State's general tax fund. During fiscal year 2011, the State of Utah collected about $5,784,545 from conservation fees (Utah State Tax Commission 2012b).

3.16.3.6 Property Tax Revenue

Among the most important sources of revenue for county governments are property taxes levied on locally and centrally assessed property. Within the State of Utah, slightly more than half of property tax revenue (53.29 percent) is allocated to school districts. Another 19.65 percent is distributed to the counties, 13.75 percent is dispersed to special districts, and the remaining 13.25 percent is distributed to cities and towns (Utah State Tax Commission 2012b).

Given their relatively high assessed value, oil and gas exploration and production contributes to a substantial portion of a county's property tax base. **Table 3.16.3.6-1** provides a summary of property taxes associated with oil and gas development for the counties within the MBPA.

TABLE 3.16.3.6-1
PROPERTY TAXES LEVIED ON OIL AND GAS EXPLORATION AND PRODUCTION WITHIN DUCHESNE AND UINTAH COUNTIES

County	Property Class	2008		2009		2010	
		Taxable Value ($million)	Taxes Charged ($million)	Taxable Value ($million)	Taxes Charged ($million)	Taxable Value ($million)	Taxes Charged ($million)
Duchesne	Oil & Gas Extraction	516.4	5.8	548.0	6.3	521.1	6.2
	Pipeline & Gas Utilities	38.2	0.43	38.3	0.44	37.6	0.45
Uintah	Oil & Gas Extraction	2,000.8	19.3	2,091.4	20.7	2,117.5	21.7
	Pipeline & Gas Utilities	163.3	1.6	166.0	1.7	159.0	1.6

Source: Utah State Tax Commission, 2009-2011.

Property taxes collected on natural resources within the State of Utah totaled approximately $118.9 million in fiscal year 2011, which is approximately 4.6 percent of the total property taxes collected (Utah State Tax Commission 2012b). According to the 2010 Annual Statistical Report, approximately 37 percent of the property taxes levied on natural resources are associated with oil and gas extraction (Utah State Tax Commission, Property Tax Division 2011).

Due to the level of oil and gas development within the Uinta Basin, Duchesne and Uintah Counties derive more benefit from property taxes associated with oil and gas activities than the state as a whole. Statewide, 1.7 percent of total property taxes that were levied on locally and centrally assessed property were derived from oil and gas extraction. However, 33 percent of such property taxes in Duchesne County and 46 percent in Uintah County were derived from these activities. The combined property taxes that were levied on oil and gas extraction in Duchesne and Uintah Counties comprised nearly 63.5 percent of the total oil and gas extraction property taxes levied statewide (Utah State Tax Commission, Property Tax Division 2011).

3.16.3.7 Surface Use Agreements

Split-estate is separate ownership of the land surface and of the mineral deposits associated with it. In most cases, mineral developers must occupy and conduct activities on a portion of a surface property to develop

the underlying minerals. Under State of Utah law, mineral owners have entry and development rights, provided that surface owners are adequately compensated for the land use and disturbance. In cases where mineral and surface ownership are held in split-estate, mineral developers and the surface land owner typically enter into a surface use agreement (SUA). The specific details of a SUA are negotiable. In general, SUAs allow the surface land owner to discuss an initial fee and annual fees. Land owners also frequently receive compensation for any loss of income incurred by the mineral development.

3.16.4 Quality of Living

3.16.4.1 Public Facilities and Services

The Duchesne County Sheriff's Department has one office with 50 full-time employees, of which 37 are sworn officers. The County Jail is a 160-bed facility that houses County and contract inmates from the State of Utah and Bureau of Indian Affairs (Duchesne County Sheriff's Department website, 2012). Information about the number of persons employed by the Uintah County Sheriff's Department is not available, and attempts to contact the Sheriff's Department for information were unsuccessful. However, according to information from the Utah Department of Corrections, Uintah County has completed a new 384-bed jail (Utah Department of Corrections 2013).

For those areas not covered by the BLM, Forest Service, or Indian trust lands, volunteer fire departments within each county provide fire protection and hazardous materials response. Duchesne County has seven fire departments serving the community, of which four are city fire departments and three are county fire departments. The county has 95 volunteer firefighters available (Duchesne County Emergency Management website 2012). Uintah County has five fire departments serving the community, of which four are city fire departments and one is a combined city and county fire department. There are a total of 86 volunteer firefighters (Uintah County Emergency Management 2012).

The Uinta Basin Medical Center, a 42-bed general hospital located in Roosevelt, provides medical services for Duchesne County (Uintah Basin Healthcare 2012). This facility is currently adding three (3) buildings. The Ashley Regional Medical Center, a 39-bed acute care facility located in Vernal, provides medical services for Uintah County (Ashley Regional Medical Center website 2012).

The Duchesne County School District provides educational services to approximately 4,450 students in 13 schools that are located in six rural communities, of which six are elementary schools; one is a junior high school; three are high schools; one is a K-12 school; and two are special needs schools (Duchesne County School District website 2012). Uintah School District provides educational services to approximately 6,200 students in 11 schools, of which seven are elementary schools; one is a middle school; one is a junior high school; one is a high school; and one is an alternative school (Uintah County School District 2012).

Duchesne County's other services include two branches of the public library, which are located in the cities of Roosevelt and Duchesne. Other county services in Uintah County include a public library, a recreation center, and two senior service centers in Roosevelt and Duchesne. All of these facilities are located in Vernal.

3.16.4.2 Crime

The Utah Bureau of Criminal Identification, a division of the Utah Department of Public Safety produces semiannual reports on crime statistics for the State of Utah. According to the *Crime in Utah Semiannual Report*, issued for the period of January - June 2011, total crimes in Utah decreased 7.14 percent from the

same time period in 2010 (Utah DPS BCI 2011). Total arrests in Duchesne County decreased from 826 in 2008 to 521 in 2010. In Uintah County, total arrests decreased from 3,592 in 2008 to 3,521 in 2010 (Utah DPS BCI 2009, 2011).

3.16.4.3 Housing

According to the 2010 U.S. Census, there were 9,493 housing units in Duchesne County. Approximately 70.1 percent of these housing units were single-family detached or attached homes. Approximately 6.3 percent were structures with two to four units (i.e., duplexes and fourplexes), and 2.9 percent were structures with five units or more. A significant percentage of housing units (20.5 percent) were mobile homes. Of the total housing units, 6,003 units were occupied and 3,490 units were vacant. However, 2,803 of these vacant units were set aside for seasonal, recreational, or occasional use, which account for nearly 80 percent of all vacant units. There were 248 vacant residential units in Duchesne County available for sale or rent in 2010 (U.S. Census Bureau 2011).

In Uintah County, there were 11,972 housing units in 2010. Approximately 73.0 percent of these housing units were single-family detached or attached homes. Approximately 7.0 percent were structures with two to four units, and 4.1 percent were structures with five units or more. Approximately 13.7 percent were mobile homes. Of the total housing units, 10,563 units were occupied and 1,409 units were vacant. Relatively few of these vacant units were set aside for seasonal, recreational, or occasional use because only 313 such units were available. There were 644 vacant residential units in Uintah County available for sale or rent in 2010 (U.S. Census Bureau 2011).

Historically, local housing was concentrated in the cities of Roosevelt and Vernal. However, new housing construction has recently been showing up in unincorporated parts of the counties. More than 85 percent of the building permits issued in Duchesne County were for homes located in unincorporated areas, with only a slightly lower share of all permitted units located in unincorporated Uintah County (BLM 2010).

Local housing costs have increased sharply in recent years due to strong demand and more households with higher income levels. Consequently, housing affordability had been as much an issue as availability prior to the recent economic downturn. **Table 3.16.4.3-1** shows that the average sales price of homes sold in the Uinta Basin increased by 82 percent between 2004 and 2007, before declining in 2008. Increases in local housing prices outpaced the statewide increases such that the local average sale price climbed from 61 percent of the statewide average in 2004 (excluding Park City) to 85 percent in 2007. Sales prices in the Uinta Basin declined faster than the statewide average during the latter part of 2008, lowering the ratio of local to statewide prices to 78 percent.

As indicated in **Table 3.16.4.3-1**, the strong local demand for housing also is reflected in the increase in the number of sales. Housing sales climbed from 427 in 2004 to 634 in 2006, and remained close to this level in 2007 and 2008. Sales fell sharply to 342 in 2009, mainly due to economic conditions. Since 2009, home sales have risen substantially with home sales in 2011 exceeding those in 2006.

TABLE 3.16.4.3-1
HOME SALES AND AVERAGE PRICES IN THE UINTA BASIN

Year	Number of Sales	Average/Median Sales Price of Homes Sold	Local Price as Percent of State Average/Median[1]
2004	427	$115,144	61.0%
2005	544	$137,798	69.6%
2006	634	$172,132	74.5%
2007	555	$209,496	85.2%
2008	625	$187,762	78.2%
2009[2]	342	$198,000	99.4%
2010[2]	491	$156,150	82.2%
2011[2]	652	$150,000	85.8%

[1] Based on State average not including Park City.
[2] Beginning in 2009, statistics were kept for Duchesne and Uintah Counties separately, rather than for the Uinta Basin as a whole. Also, median sales prices were recorded rather than average sales price. Median sales price in this table is the higher of the median sales price recorded for Duchesne or Uintah Counties.
Source: Utah Association of Realtors 2012.

Housing availability in Duchesne and Uintah Counties has improved somewhat in the wake of the national economic recession. The slowdown has reduced the pace of oil and gas development and increased unemployment, triggering some out-migration of workers and easing demand on housing. A search of a nationwide listing service from the National Association of Realtors found 149 residential properties listed for sale within 10 miles of Roosevelt, and 213 such properties within 10 miles of Vernal. Single family homes in both areas range in price from approximately $40,000 to greater than $1,000,000 (Realtor.com 2012).

A resident workforce combined with workers who live in the area on a temporary basis but maintain a permanent home elsewhere support crude oil and natural gas development in Duchesne and Uintah Counties. The latter reside in motels, field camps, rental housing, and recreational vehicles (RVs), which can be parked at commercial campgrounds. The study area has a large existing stock of motel rooms and RV campgrounds. This includes more than 1,000 motel rooms and 500 commercial RV spaces (year-round and seasonal) in the vicinity of Vernal, Roosevelt, and Duchesne (Dinosaurland Travel Board 2012).

3.16.5 Environmental Justice

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (EPA 1998b). Consideration of environmental justice issues is mandated by EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which was signed by President Clinton in 1994. This EO requires "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations" (EPA 1994). Implementation of EO 12898 for NEPA by agency directive involves the following steps (BLM 2002b):

- Identification of the presence of minority and low-income populations and Indian Tribes in areas that may be affected by the action under consideration.
- Determination of whether the action under consideration would have adverse human health, environmental, or other effects on any population.
- Determine whether such environmental, human health, or other effects would be disproportionately high and adverse on minority or low-income populations or Indian Tribes.
- Providing opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices (EPA 1998b).

The EPA defines a community with potential environmental justice populations as one that has a greater percentage of minority or low-income populations than an identified reference community (EPA 1994). The EPA standard for identifying minority populations is typically either (1) the minority population of the affected area exceeds 50 percent; or (2) the minority population percentage of the affected area is "meaningfully greater" than the minority population percentage in the general population or other appropriate unit of geographic analysis, such as a reference community. For environmental justice compliance, the relevant minority population is the total minority population comprising all persons of a minority racial identity combined with persons of Hispanic origin (BLM 2002b). For this analysis, it is assumed that an environmental justice population is likely to exist if the affected area's minority and/or poverty status is 50 percent or greater than the reference community. The BLM standard for identifying a low-income population is the poverty level used by the U.S. Census Bureau (CEQ 1997).

Table 3.16.5-1 summarizes the proportions of low-income, minority, and Tribal populations in communities and census designated places (CDPs) associated with the MBPA. The table includes the main communities in each county in the MBPA as well as the three communities within the Uintah and Ouray Reservation. For the purposes of assessing the presence of environmental justice communities, Duchesne County, Uintah County, and the cities therein are considered the reference communities. The Reservation communities are referred to as CDPs, which are defined as unincorporated communities with boundaries defined for purposes of enumeration during the decennial census. For comparative purposes, State of Utah percentages are also provided.

TABLE 3.16.5-1
INCOME AND MINORITY CHARACTERISTICS OF SELECTED COMMUNITIES ASSOCIATED WITH THE MBPA

Community	Percent of Total Population in Poverty	Minority Race or Hispanic as a Percent of Total Population	Percent American Indian
Duchesne County	**12.4**	**11.3**	**4.5**
Duchesne City	12.5	5.0	0.7
Myton	20.1	24.5	8.6
Roosevelt	18.7	18.5	8.2
Uintah County	**11.7**	**15.9**	**7.7**
Vernal	15.6	9.0	2.2

Community	Percent of Total Population in Poverty	Minority Race or Hispanic as a Percent of Total Population	Percent American Indian
Naples	6.2	10.2	1.0
Ballard	7.4	11.8	4.7
Uintah and Ouray Reservation*	**20.2**	**17.5**	**14.5**
Fort Duchesne CDP	55.0	95.2	90.2
Randlett CDP	54.0	96.4	93.3
Whiterocks CDP	74.0	94.7	93.8
State of Utah	**11.4**	**24.2**	**1.2**

* Data not updated since 2000.
Sources: U.S. Census Bureau 2010, 2011

The data in **Table 3.16.5-1** suggests that the Tribal communities on the Uintah and Ouray Reservation are the primary areas of concern. The communities with a poverty rate of over 50 percent include Fort Duchesne CDP, Randlett CDP, and Whiterocks CDP, which has the highest poverty rate (74 percent) of the communities evaluated. By comparison, poverty rates in the reference communities range from 20.1 percent in Myton to 6.2 percent in Naples. The table also shows that the Reservation communities are predominantly minority communities, each having greater than 90 percent of its population a minority race, mainly American Indian. The concentration of the American Indian population in the three CDPs is consistent with a 1994 survey of the Ute Tribe members, in which 64 percent of the respondents living on the Reservation reported their residence in Whiterocks, 16 percent in Fort Duchesne, and eight 8 percent in Randlett. The remaining survey respondents cited places of residence not enumerated by the U.S. Census Bureau (BLM 2011d). The minority population percentages elsewhere in Duchesne and Uintah Counties, including rural areas near the MBPA, are not meaningfully higher than the reference communities or the State, except for Myton. Myton has a higher minority population percentage than Duchesne County; however, it is not meaningfully higher than the State percentage.

In summary, economic and demographic data from the 2010 U.S. Census and the 2007-2011 American Community Survey indicate several concentrations of minority and/or low-income populations residing north of the MBPA, thus meeting the BLM standard for analysis of potential environmental justice communities.

3.16.6 Ute Indian Tribe

3.16.6.1 Demographics

Portions of the MBPA border the Uintah and Ouray Indian Reservation. Established in 1861, the Reservation is Utah's largest, with approximately 1.4 million acres, and is the home of the Ute Indian Tribe. The Reservation is approximately one-third of its original size of 4.0 million acres. Through a series of land takings by the U.S. Government, the Reservation was gradually reduced in the early 1900s. Throughout the last century, ongoing legal disputes over land ownership and water have resulted in the expansion of the Reservation to its current size.

As of the 2010 U.S. Census, the population of the Reservation was 24,369 residents (U.S. Census Bureau 2011). However, this includes both tribal and non-tribal members residing within general Reservation

boundaries. There are 3,090 enrolled members of the Ute Tribe. Approximately 66 percent of those with tribal membership currently live on the Reservation or on off-Reservation trust land (Utah Division of Indian Affairs 2012). There were 7,788 households on the Reservation in 2010. Of these, 78.4 percent were family households, and 17.8 percent had a householder living alone. The average household size was 3.09 persons, while the average family size was 3.52 persons (U.S. Census Bureau 2011).

As of 2010, a total of 11,695 housing units were located on the Reservation. Approximately 66.5 percent of these units were occupied. Of these occupied units, 77.8 percent were owner-occupied, either free and clear or with a mortgage. Most of the vacant housing units (76.6 percent) were set aside for seasonal, recreational, or occasional use (U.S. Census Bureau 2011).

3.16.6.2 Local Economy and Employment

A variety of industries help sustain the tribal economy. **Table 3.16.6.2-1** provides a breakdown of the job sources for residents within the Reservation by employment sector. The largest source of employment that brings revenue into the Reservation is education, health, and social services. This sector accounts for 20.5 percent of employment for population 16 years of age and over. Other significant employment sectors include agriculture, forestry, mining, and fishing and hunting; retail trade; public administration; transportation, warehousing and utilities; and arts, entertainment, recreation, accommodation, and food services. Almost one-fourth (24.3 percent) of the Reservation's working population is employed by the government. Most of the remaining workers are employed by the private sector, with approximately 6.4 percent self-employed (U.S. Census Bureau 2011).

According to the U.S. Census 2007-2011 American Community Survey 5-Year Estimates, the unemployment rate for the population on the Reservation 16 years and older was 3.4 percent (U.S. Census Bureau 2011). This rate was lower than the average unemployment rate in the State of Utah (6.5 percent) and the United States (8.7 percent).

TABLE 3.16.6.2-1
JOB SOURCES FOR RESERVATION RESIDENTS BY EMPLOYMENT SECTOR

Employment Sector	Number of Jobs	Percent of Total
Agriculture, Forestry, Mining, and Fishing and Hunting	1,647	18.1
Construction	644	7.1
Manufacturing	133	1.5
Wholesale Trade	202	2.2
Retail Trade	918	10.1
Transportation, Warehousing, and Utilities	739	8.1
Information	271	3.0
Finance, Insurance, Real Estate and Rental and Leasing	245	2.7
Professional, Scientific, Management, and Administrative Services	461	5.1
Education, Health, and Social Services	1,871	20.5
Arts, Entertainment, Recreation, Accommodation, and Food Services	714	7.8

Employment Sector	Number of Jobs	Percent of Total
Other Services	409	4.5
Public Administration	866	9.5
Total	**9,120**	**100.0**

Percentages do not total 100.0 percent due to rounding.
Source: U.S. Census Bureau 2011.

According to the U.S. Census 2007-2011 American Community Survey 5-Year Estimates, the median income of Reservation households was $56,100, which was lower than that for the State of Utah ($57,783) but higher than that for the national median income ($52,762). Approximately 9.2 percent of all families on the Reservation lived below the poverty level within the past 12 months, compared with 8.3 percent in Utah and 10.5 percent in the United States. Among American Indian families residing on the Reservation, the poverty level was 18.3 percent. Because poverty thresholds in the United States are determined by a combination of factors (i.e., age, income, and family size) no single standard currently exists by which a family is determined to be in poverty. Nevertheless, for a family of three with one child, the 2007-2011 American Community Survey calculates that the poverty level is $17,438 (U.S. Census Bureau 2011).

Under Ordinance No. 92-07, the Ute Indian Tribe established a Contracting Preference Ordinance for all Reservation employers. Passed in 1992, this Ordinance requires enterprises doing business within the Reservation to employ, to the greatest extent possible, tribal members and tribally-owned subcontractors.

3.16.6.3 Ute Tribal Fiscal Conditions and Revenues from Oil and Gas Activities

Revenue generated through mineral extraction is an important source of income for tribal members. At the present time, a complex mix of surface ownership of mineral rights exists within the Reservation; however, many of the minerals located beneath the Reservation are generally owned by tribal allottees or the Ute Indian Tribe. For Indian trust mineral ownership, lease royalties are collected. The mineral lease rate on Indian trust minerals is typically between 12.5 and 18 percent of the gross value of the resource being sold. The exact mineral lease rate on Indian trust lands affected by the Proposed Action is not disclosed, because it is considered confidential information.

In addition to collecting mineral lease royalties, the Tribe levies a severance tax on all oil and gas that is produced, transported, or sold.

In areas where surface and mineral ownership are held in split estate, the Tribe collects revenue by entering into SUAs. SUAs provide compensation for the disturbance and/or the loss of income (e.g., agricultural land and crop production lost as a result of oil and gas development). Revenue from SUAs in the MBPA is negotiated with the Tribe on a case-by-case basis.